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Dealing with Complex Issues: Networking, Creative Dialogue and a Sense of Audience in Environmental Management

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ABSTRACT

In recent years organisational decision-makers have been portrayed within the media and academic literature, as struggling to deal with complex, transboundary issues. Such issues typically involve interactions between social and natural processes which produce effects distant in time and space from their recognised cause, with pertinent processes transcending the boundaries of interest and authority associated with any single organisation. In these situations, debate about the significance of phenomena, and about who should respond, is often intense with consensus apparently limited to the belief that not enough is known. Using the arena of environmental management as its central example, this thesis argues that those who consider themselves part of the process of dealing with such complexity should seek to be guided by an acute 'sense of audience'.

This call for reflexivity - continually modifying one's behaviour in response to an emerging appreciation of how others interpret a dynamic situation in which one is actively engaged - is demonstrated in both the content and structure of the research presented in support of the thesis.

Through an adaptive research process characterised by continual movement between the field and relevant literatures, the 'sense of audience' thesis is joined by emergent concepts of 'networking' and 'creative dialogue'. These provide practical guidance on how pertinent perspectives can be brought together to discern desirable and feasible interventions on complex issues. Grounded in insights gained through participative research with organisational actors attempting to develop integrated approaches to environmental management in a range of settings, these emergent concepts are interwoven with aspects of the contexts that inspired them, to produce a 'constituitive process theory' of the formation of 'adaptive response networks'. This theory shows how networks can form across organisations when diverse stakeholders are encouraged to share their concerns, data and expertise about complex, transboundary issues.

To my family for their support and inspiration.

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1. RESEARCH THEME AND RATIONALE FOR THE STUDY

1.1 INTRODUCTION

This chapter will introduce the central proposition of this work, that:

> a 'sense of audience' is a valuable guiding principle for those who see themselves as part of the process of dealing with complex issues in organisations.

By defining the subject of the proposition in this way, the thesis establishes its intent to be of relevance to individuals who choose to adopt researcher and/or practitioner roles within the process of dealing with complex issues. It is these individuals who are invited to make judgements on the value of its message. In order that those judgements can be well informed, this document recounts two interlinked stories. These concern organisational actors' dealings with complex, transboundary environmental issues, and my dealings with the complex issues that arose when I set out to help them. The two stories come together to emphasise the importance of an adaptive approach to dealing with complex issues and each provides grounded support for the 'sense of audience' thesis. Somewhat unusually for a document submitted as a Doctoral thesis, the emphasis placed on adaptivity is demonstrated in both the content and structure of the text.

With reference, first, to the content of the text, the following chapters set out an argument that those who assume responsibility for an issue they recognise as complex and transboundary should consider enhancing their adaptive capacity for dealing with it by forming ties with others who have an interest in, or a capacity to influence, the issue. That those others will most likely hold different organisational allegiances and identities is both the raison d'être and the central challenge for the approach. This call for transboundary collaboration, through adaptive response networks (as they will be termed), can be usefully contrasted with the option of concentrating effort on changing the boundaries of an existing organisation so that it aligns more appropriately with a pressing issue. This latter option is not without merit, but it runs the risk of being a continuous game of 'catch-up' if issues within its remit are numerous and dynamic in character.

Organisational actors seeking an holistic approach to managing complex issues must decide for themselves which pathway enables them to focus their attention and effort with greatest effect. They are thus invited to critique the ideas herein.

The structure used to organise material in support of this argument provides the second demonstration of this work's emphasis upon an adaptive approach to complexity. This structure reflects the "natural history" (Hammersley and Atkinson, 1983) of the research in which the argument is grounded. Following a research agenda initially inspired by a survey of the literature of environmental management, subsequent chapters chart the development of that agenda as it is modified through a mutually-informing relationship between insights gathered from the field and relevant literature. In this way, the study itself can be seen to be adapting to my emerging understanding of pertinent complexity. The rationale and practical implementation of this adaptive model of research are likely to be of particular interest to those who study organisational actors' dealings with complex issues.

However, this does not suggest that this work seeks to create a divide between research and practitioner audiences. Instead, just as the structure and content of the text are interwoven and its two stories are interlinked, readers who identify with a researcher or practitioner role are invited to learn from insights oriented towards the other. Indeed, in demonstration of the 'sense of audience' thesis which opened this document, the story-telling device the work introduces (which will be termed a constituitive process theory after Walsham, 1993) is designed to integrate stereotypically-polarised interests. This will be seen, for instance, in the way in which the device encompasses both noun and verb connotations of 'network' in its representation of transboundary responses to complex issues:

> "Whereas academics typically talk about 'networks' or 'network organisations', it is much more common for managers to talk about 'networking'. In contrast to academics, who are interested in *understanding* the noun and adjective, are the managers who are interested in *using* the verb."
> (Kanter and Eccles,, 1992, p. 521, italics in original)

This section has presented an overview of both the content and structure of this thesis document, noting in particular its emphasis on adaptivity and a sense of audience. It has offered a glimpse of the substantive contribution from the work: the notion of adaptive response networks, characterised by individuals' collaborative efforts to deal with complex environmental issues that have no respect for organisational boundaries. This glimpse is offered not to spoil the ending of the story about organisational actors' dealings with complex issues, but rather to facilitate appreciation, in a single pass, of the adaptive nature of the process through which the contribution has been developed. As this is a long document, it would be against the 'sense of audience' principle if the emergent trajectory in the research agenda were only apparent on re-reading !

The following sections will now introduce the background to the work and provide a more detailed overview of the structure and style that will be used to present it.

1.2 BACKGROUND

In recent years, a popular image has formed in the media, and in academic literature, of organisational decision-makers struggling to deal with increasingly complex issues. This image is perhaps exemplified by the challenges that government, farmers, health organisations and others face in responding to the UK's recent "B.S.E. crisis". Issues have tended to be characterised by complex interactions between social and natural processes that produce effects distant in time and space from their recognised cause. Debate about the significance of phenomena, and about who should respond, seems to be intense and consensus often appears limited to the belief that not enough is known. In issues regarded as particularly complex, pertinent processes frequently transcend the boundaries of interest and authority assumed by individual organisations, a phenomenon reflected most obviously in concerns over "environmental issues".

Although the label 'environmental' appears to stress the 'outsideness' of such issues, decision-makers in organisations in the industrialised western world are coming under increasing pressures to recognise and to find ways of dealing responsibly with their role in

complex environmental issues, such as global climate change (Stead and Stead, 1992). In its call for a heightened 'sense of audience' amongst those who assume responsibility for dealing with such issues, this thesis invites those individuals to consider how their actions are felt by others. It will become clear that this is an invitation to a journey rather than a destination.

Pathways by which actions become felt by 'others' can change and are often not immediately obvious (Lemon, 1991). A 'sense of audience' therefore requires an on-going willingness to learn from the voices of relevant 'others'. Unfortunately, many of the 'others' affected by the actions of organisational decision-makers are not easy to hear or, worse, do not have a recognisable voice. Ecologists and pressure groups have assumed responsibility for providing a voice for some of these 'others' and some of their voices - for instance, Rachel Carson's (1963) - have been heard far and wide, and still echo today (BBC, 1996b). However, some 'others' that will feel the effect of actions taken today are yet to be born. Whilst this responsibility can be ignored by those in the present, it will not go away. In Senge's words:

> "Herein lies the core learning dilemma that confronts organisations: we learn best from experience but we never directly experience the consequences of many of our most important decisions. The most critical decisions made in organisations have systemwide consequences that stretch over years or decades." (1990, p. 23).

If one is to be informed by the diverse audiences for one's actions, then that diversity must somehow be represented. Notions of stakeholders have proved a popular mechanism for this (Mitroff and Linstone, 1993), with many theorists offering lists of 'usual suspects' for consideration (see, for instance, Stead and Stead, 1992; or Welford and Gouldson, 1993). Such predetermined classification of diverse audiences can often fail to represent adequately the diversity therein. Indeed, stereotypes of scientists, the public and business can obscure the subtle (and sometimes pronounced) variations that many consider vital for managing change (Argyris, 1993; Buchanan and Boddy, 1992). The sense of audience thesis thus appears as a call to recognise, on an on-going basis, the

tentative nature of categorisations used to represent the diverse and changing audience for one's actions.

As individuals' actions and their consequences become entangled in a web of interactions that grows in complexity, spreading out over time and across space, touching ever more distant and diverse audiences, the need for accessible knowledge on how organisational actors can deal with complex issues becomes increasingly apparent. Unfortunately, what is also apparent is that there is no 'right answer' out there waiting to be discovered - as Handy (1994) observes:

> "Life will never be easy, nor perfectible, nor completely predictable. It will be best understood backwards, but we have to live it forwards. To make it liveable, at all levels, we have to learn to use the paradoxes, to balance the contradictions and the inconsistencies and to use them as an invitation to find a better way." (p. 18).

The 'sense of audience' thesis introduced within this document is offered as a contribution towards dealing with the complexity that Handy and others identify in the modern world. In order that the contribution from this thesis can be grounded in, and informed by, the realities of individuals for whom it is offered, a supporting research study is now introduced.

1.3 RESEARCH STUDY

Section 1.2 highlighted the need for accessible knowledge to facilitate organisational actors' dealings with complex issues and suggested that growing pressures on organisations to respond responsibly to the challenges posed by environmental issues was making this need particularly acute. It would therefore not be unreasonable to suggest that organisational actors' attempts to manage environmental issues constitute an appropriate setting in which to ground a thesis about dealing with complex issues. An initial decision is therefore taken to locate this research study in the environmental management arena.

Having decided where the study will be located, it is now important to consider what, in particular, it will focus upon and how it will be undertaken. Its overall focus clearly lies in supporting a thesis on how organisational actors deal with complexity, and its approach needs to be consistent with the 'sense of audience' proposition. These broad parameters will shape the development, implementation and evaluation of the research study described in the following chapters. The structure that will be used to present this process is now described.

1.4 STRUCTURE

An overview of the structure of this document is provided below in diagrammatic and textual formats. The format used for the diagrammatic overview (Figure 1-1) is adapted from Vidgen's (1996) overview of his PhD thesis structure. It is designed to highlight particularly important linkages between chapters and between the three major sections of the document.

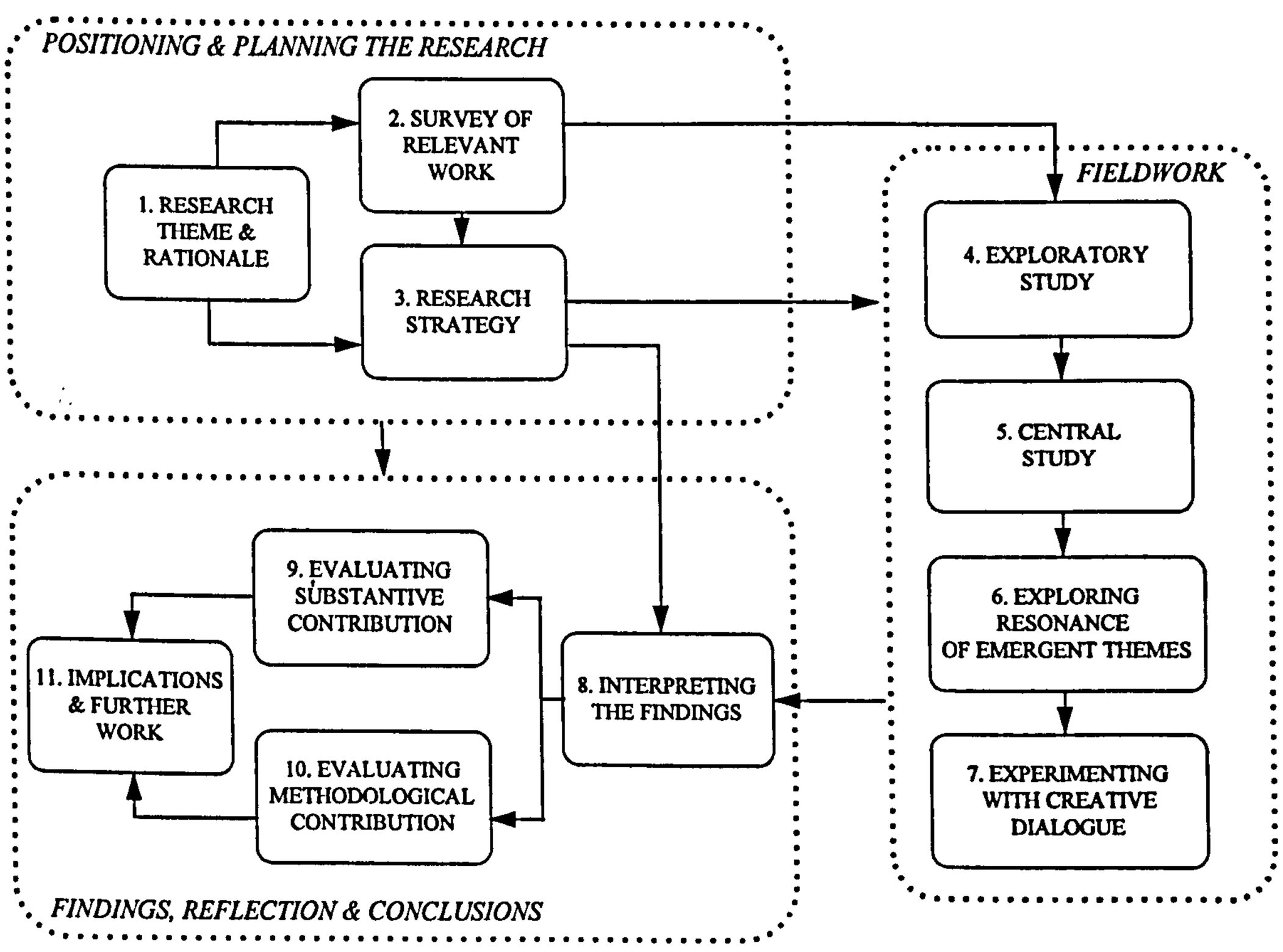

Figure 1-1 Diagrammatic overview of document structure

1.4.1 POSITIONING AND PLANNING THE RESEARCH

In order to provide grounded support for the 'sense of audience' proposition, a research study will be described that involved investigating organisational actors' attempts to manage environmental issues. At this stage, the decision to locate the study in the environmental management arena has been justified on the grounds that it appears, first, to be theoretically and methodologically interesting and, second, to be practically relevant. Later, the validity of this positioning will be assessed through a survey of published contributions on environmental management. This literature survey will appear in Chapter 2. The literature survey will also be used to set an initial research agenda and to raise awareness of methodological challenges that the study is likely to face. These methodological challenges will be addressed in Chapter 3's development of an adaptive, participative research strategy that is guided by the principle of a sense of audience.

1.4.2 FIELDWORK

The initial research agenda and the research strategy, developed in Chapters 2 and 3 respectively, will then inform the study's fieldwork as it moves from an exploratory phase (Chapter 4), to a central study (Chapter 5), to an exercise to assess resonance of the emerging themes (Chapter 6), and, finally, to an experiment in which an attempt is made to put the themes into practice (Chapter 7). A conceptual framework, developed in Chapter 3, will be used to provide a consistent structure for the accounts of the fieldwork that appear in each of the four stages.

1.4.3 FINDINGS, REFLECTION AND CONCLUSIONS

Chapter 8 will reflect upon the research techniques developed and used in the field, and findings from the fieldwork will be interpreted using a conceptual framework identified as suitable for linking the content, context and processes of environmental management. This single-loop level of analysis will be accompanied by deeper analysis that questions the assumptions on which the substantive and methodological findings were drawn. This critical evaluation of contributions in each area will appear in Chapters 9 and 10,

respectively. The final chapter, Chapter 11, will then consider the implications of the thesis for areas other than environmental management and conclude by suggesting areas deserving of further study.

1.5 STYLE

In keeping with Law's (1994) view of research as being both about telling stories of social ordering, and a process of ordering in itself, the content and structure of this document are designed to tell two interlinked stories. One concerns organisational actors' dealings with complex transboundary environmental issues; the other concerns my efforts to help them through participatory research. The way in which these stories are developed and interwoven within the text is used to reinforce the document's message about the value of adaptive approaches to complexity. This literary device is complemented by another which reminds the reader that the document itself is an effect of my ordering of material and insights. Use of the first person, in this way, is thus a deliberate attempt on my part to "appear" within the text at salient points:

> "When we write, we may conceal in various ways. Sometimes we make nature (or society) speak instead of us. Under these ordering conventions the author may disappear from the narrative altogether. Sometimes we allow ourselves a passive voice, and appear in the text as rapporteur or commentator. But the more we appear in our own narratives, the more we move away from such attempts at empiricist ordering. The less nature seems to speak for itself. And the more the writer becomes visible as composer, crafts-person, or even creative genius" (Law, 1994, p. 31)

Whilst I make no claims to "creative genius", this document does represent the outcome of my deliberations about what (and what not) to include of my experiences with the literature, the field and elsewhere over approximately the last four years. For convenience most of those deliberations are effaced and the research process is thus smoothed (Hammersley and Atkinson, 1983). However, in order to remind the reader that ordering was at work in the original doing, and in the subsequent writing, I will appear from time to time in the following chapters. Hopefully, use of the first person will be sufficiently

infrequent for it neither to be intrusive, nor taken-for-granted, as this will help to maximise its effect.

1.6 SUMMARY

This introductory chapter has identified environmental management as a suitable setting for a research study to:

- support the thesis that a sense of audience is a valuable guiding principle for those who see themselves as part of the process of dealing with complex issues in organisations; and
- develop a grounded contribution to knowledge on organisational actors' dealings with complex issues.

The chapter has also described how the study and supporting argument for the thesis will be presented within this document. In particular, the chapter has alerted the reader to the emergent nature of the research agenda that will form around the central interest in organisational actors' dealings with complex environmental issues. In order to further the process of exploring and explicating that agenda, the following chapter now embarks on a guided search of relevant literature.

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2. SURVEY OF RELEVANT WORK

This chapter will first identify literatures relevant to the substantive theme outlined in Chapter 1. A survey of relevant research is then undertaken with a view to:

- highlighting work undertaken in the area;
- developing sensitivity to key themes developed in pertinent studies; and
- recognising challenges faced and choices made by previous researchers.

The chapter reveals variation in the level and focus of existing studies, and notes how many of the studies transcend traditional disciplinary boundaries. A critique is then undertaken to identify recurrent themes that are of particular relevance to this research project. The research agenda formulated in this critique invites consideration of:

- approaches to dynamic complexity;
- notions of stakeholders;
- an apparent sense of crisis;
- problems of lots of data but little information;
- opportunities for integrated multi-party approaches to environmental management; and
- important linkages between perceptions, structures and actions taken by individuals.

Finally, in order to be forewarned about possible problems for this research study, the chapter concludes by highlighting three key methodological challenges that other environmental management researchers have faced, namely:

- transcending disciplinary boundaries;
- investigating a world in which the researcher is an active part; and
- the need for theory that links the content, context and processes of environmental management.

2.1 IDENTIFYING RELEVANT LITERATURES

This study seeks to gain understanding of how organisational actors deal with complex issues and therefore a wide range of literatures, such as complexity, organisational theory, organisational learning and organisational psychology, can be considered immediately relevant. In order to develop critical awareness of possible contributions from such

literatures, a topical problem focus has been identified in Chapter 1 that will guide the literature survey that informs this research project; that problem focus is environmental management.

Although widely used, the term environmental management appears to have many different meanings (Shrivastava, 1994). Within the literature of organisational theory, uses of the term tend to assume a systems metaphor for organisations (Morgan, 1986) and authors thus concern themselves with how an entity scans for and plans its interactions with things of significance that lie outside of its boundary (see, for instance, Beer, 1981 and 1985). This conceptualisation of an organisation as an 'open system' dominates recent organisational theory literature (Daft, 1992) and has encouraged researchers to consider the responses organisations take to complex and uncertain environments. In this vein some researchers have concentrated on ways in which organisations track and predict the behaviour of elements considered to be significant in their environments (eg. Fahey et al., 1981; Glaister and Thwaites, 1993; Large, 1992; and Russell and Prince, 1992); others have concentrated on ways in which organisations attempt to maintain congruence between their internal configuration and their external environment (eg. Burns and Stalker, 1961). These researchers have tended to focus upon the behaviour of customers, suppliers, competitors, shareholders, government and legislators, as key sources of significant environmental uncertainty for organisations (Buchko, 1994; Daft, 1992).

However, in recent years a growing number of authors have started to criticise traditional organisational theorists for adopting an overly narrow prescription of significant environmental factors (Shrivastava, 1994; Stead and Stead, 1992). They claim that the activities of modern organisations have the potential to cause lasting damage to eco-systems and to societies worldwide, and they argue that socio-ecological responsibilities constitute a new agenda to which organisations must attend (Welford, 1996a). They acknowledge additional complexity that organisational actors would have to deal with if the organisational agenda were widened in this way, but argue that it is essential to take action now for the sake of future generations.

Consideration of man's relationship with the world around him is hardly new (see, for instance, historical analysis in Grove, 1992; Hugget, 1994; or Tribe et al., 1976) and relevant contributions may be found in a range of established disciplines, such as human geography, ecology and natural resource management. However, growing interest in organisations' environmental management efforts has inspired contributions that attempt to transcend traditional disciplinary boundaries (see, for instance, Chechile and Carlisle, 1991; or Hadfield and Cannibal, 1996). Interest in organisations' environmental management efforts is now supported by a growing range of specialist journals, eg. 'Business Strategy and the Environment', 'Environmental Management', 'Greener Management International' and 'Total Quality Environmental Management'. Furthermore, the arguments of environmental management researchers are starting to receive the attention of established organisational theorists such as Michael Porter (Porter, 1991; Porter and van der Linde, 1996). It is this new, transdisciplinary debate about managing environmental issues in an organisational context that provides the focus for the literature survey which follows.

2.2 REVIEWING THE LITERATURE ON ENVIRONMENTAL MANAGEMENT

The aim of this literature survey is to develop awareness of substantive findings and, where possible, methodological choices represented in published contributions in the area of environmental management. Authors who have considered the nature and findings of research undertaken in other fields of organisational research argue for the importance of recognising explicit or implicit assumptions about the level at which published research seeks to make a contribution, the notions of causality the research employs, and the logical structure of the theories it advances (Markus and Robey, 1988). With these criteria in mind, the review of environmental management research which follows first locates relevant work according to the level at which it seeks to make a contribution. In an attempt to contend with the controversy and confusion that surrounds issues of level in social and organisational research (see, for instance, Giddens, 1984; Granovetter, 1973; Klein et al., 1994; Markus and Robey, 1988; and Pettigrew, 1992), a typology of levels is introduced to categorise the 'focus' or emphasis of relevant environmental research:

- global
- national/regional
- eco-system
- community
- industry/organisational sector
- inter-organisational
- organisational
- individual

These categories are introduced solely to provide a structure for organising relevant contributions according to their dominant focus; the typology is not intended to imply that research could, or should, only be conducted at a single level. Indeed, the fact that the emphasis of this research study is on how organisational actors deal with complex issues, yet research from a range of levels is reviewed below, demonstrates commitment to the principle of establishing a broad, multi-level appreciation of the context for attempts to manage environmental issues in organisations.

2.2.1 CONTRIBUTIONS AT A GLOBAL LEVEL

Concerns about the impact of humans on the biosphere, both now and in the future, dominate the research agenda at the global level. Key research issues include:

- global climate change (eg. Ramanathan et al., 1985; Sulzman et al., 1995; Sun and Wang, 1996; Watson et al., 1996; White, 1990);
- concerns over deforestation (eg. Postel, 1988);
- concerns over loss of biodiversity (eg. Wilson, 1989);
- predictions on population growth and world-wide patterns of consumption (eg. Ehrlich and Ehrlich, 1990; Hardin, 1968);
- debate over the extent to which environmental considerations should shape global trade patterns (eg. Anderson and Blackhurst, 1992; Bhagwati, 1993; Daley, 1993; Himmelberger and Brown, 1995; Paye, 1993); and
- debate about inequity between developed and developing countries (eg. Blowers, 1993; Redclift, 1995; Robertson, 1996; Smith and Blowers, 1992).

Many of these studies have sought to establish causal relationships between human activity and the state of the planet's natural environment, with a view to revealing particular trends or dynamics that demonstrate cause for concern. The International Journal of Environmental Conservation, for instance, is "devoted to maintaining global viability through exposing and countering environmental deterioration resulting from human population pressure and unwise technology". In response to such concerns, a growing number of authors are calling for a post-modern philosophy that will transform society, particularly free-market capitalism, so that development is placed on a sustainable footing[1], and environmental quality is preserved for future generations (see, for instance, Daley and Cobb, 1989; Hawken, 1996; Robertson, 1996; Schumacher, 1973; Stead and Stead, 1992).

> "... global environmental change demands a new, 'post-modern' science to cope with the sustainability questions, where 'facts are uncertain, values in dispute, stakes high and decisions urgent' ..." (Dovers, 1994, p. 34).

Contributions on the extent to which a philosophy for "thinking global and acting local" is emerging, or can be developed, on a personal level are considered later in section 2.2.8, but many authors agree that new measures of accounting for organisational performance are an important first step in changing people's perceptions (Daley and Cobb, 1989; Gray et al., 1993; Handy, 1994; Pearce et al., 1992). A more detailed review of contributions on appropriate methods for assessing organisational performance follows in section 2.2.7.

2.2.2 CONTRIBUTIONS AT A NATIONAL/REGIONAL LEVEL

Debate over appropriate regulatory and economic frameworks that will lead organisations to assume responsibility for environmental issues, provides a major focus for contributions at a national/regional level, particularly:

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[1] See Pearce et al. (1992, pp. 173-185) for a collection of definitions of Sustainable Development.

- analyses of regulatory and market instruments designed to promote improved environmental performance (eg. Ball and Bell, 1995; Barde and Opschoor, 1994; Delbeke, 1991; Garbutt, 1995; Jacobs, 1991; and Stubbs, 1995);
- accounts of the use of particular instruments in particular countries (eg. Burton's (1989) study of public access to environmental information regulations in the UK; Georg's (1994) investigation of environmental legislation in Denmark; Maltby's (1995) analysis of the debate over a legal framework for contaminated land in the UK; Renger's (1992) comparison of the implementation of environmental law in European Member States; and Riddell's (1996) analysis of the introduction of the landfill tax in the UK); and
- views on the role of environmental standards in establishing conditions within nation states that encourage innovative, environmentally-sensitive businesses (eg. Glachant, 1994; Porter, 1991; Porter and van der Linde, 1996; Sutton and Hills, 1996).

Other contributions at this level have drawn national comparisons of awareness and understanding of environmental issues for particular population groups, eg. Birkin and Jorgensen's (1994) comparison of approaches to corporate environmental reporting in Denmark and the UK; and Peattie and Ringler's (1994) comparison of corporate perceptions of environmental issues in the UK and Germany.

2.2.3 CONTRIBUTIONS AT AN ECOSYSTEM LEVEL

Ecosystems have been identified as an important 'natural' level for research that seeks to facilitate environmental management practice (Allen, 1991; Gonzalez, 1996; Levine, 1991):

"Several characteristics of ecosystems are particularly important in establishing successful environmental-management policies. Ecosystems are unusually diverse systems; they typically contain a great number of species, individual organisms and numerous abiotic components. The organic constituents exhibit a wide array of behaviours, with the result that interactions are varied and often subtle. The system

components, living and non-living, are linked together by numerous ever-changing flows of matter and energy. Ecosystems are dynamic." (Levine, 1991, p. 38)

Emphasis of published ecosystem research is divided between approaches to modelling ecosystem behaviour and accounts of ecosystem management approaches in particular geographical areas. Examples of the former include Allen's (1991) consideration of evolutionary approaches to fisheries modelling and Nip and de Haes' (1995) comparison of black, grey and white box modelling approaches. Examples of the latter include Likens' (1985) discussion of an aquatic ecosystem approach to managing Mirror Lake and its environs and Lajeunesse et al.'s (1995) reflections on the development and application of an ecosystem management approach to the Point-aux-Prairies island park in Montreal.

All these researchers present strong arguments that ecosystems constitute an appropriate level for contemplating management interventions. They also broadly agree with Nip and de Haes' (1995) findings that any approach for planning interventions that is guided by a single perspective or model, is likely to suffer from "blind spots". Indeed, Nip and de Haes suggest that all models, whether they be mental or computerised,

"... each have their own distinctive information content, and differ in sensitivity, discernment, diagnostic capacity and early-warning character." (1995, p. 143).

2.2.4 CONTRIBUTIONS AT A COMMUNITY LEVEL

Some community-level studies have attempted to assess congruence between mental models used by individuals who assume responsibility for environmental management, and those in use by members of a community affected by their actions. Qualitative community-perception research in this vein includes McNaghten et al.'s (1995) focus-group study of perceptions of sustainability and responsible institutions in Lancashire, and Lemon's (1991) 'pathways' analysis of interpretations of land-use planning in a rural community in Bedfordshire. These recent studies echo recurrent themes in UK community-perception research that emerged in the early 1970s. In particular, they

highlight the importance of a socially-constructed 'sense of place' and call for on-going dialogue "between designer and designed for" that is not restricted to communication with a "chosen few" (Goodey, 1974).

Other community-level studies have analysed incidents or initiatives that influence the quality of the local environment. For instance, Tribe et al. (1976) offer an account of differing local perspectives on a dam project and Sirmon et al. (1993) investigate a local coalition of interests surrounding the control of off-road vehicles in the Huron-Manistee National Forest. Some studies at this level have focused upon environmental catastrophes, such as the release of gas into the environment surrounding Union Carbide's plant in Bhopal, India (see, for instance, Mitroff and Linstone, 1993, pp. 111-135; or Shrivastava, 1987). Many of the themes highlighted earlier, particularly diverse perceptions of risk (Smith and Elliot, 1992) and a need for dialogue and shared understanding, also feature in these accounts of incidents or accidents, and there have been several attempts to develop collaborative models for environmental planning and management that accommodate diverse community perceptions. Selin and Chavez (1995), for instance, argue that:

> "Understanding those underlying forces that both facilitate and inhibit collaboration in environmental settings should be the first step towards designing new forms of public participation in resource policy decision making." (p. 194).

They conclude by highlighting the need for interpretive case studies and longitudinal research which will "fully capture the essence" of issues of collaboration and wider involvement in environmental management settings (ibid.).

2.2.5 CONTRIBUTIONS AT AN INDUSTRY/ORGANISATIONAL-SECTOR LEVEL

Studies that adopt an industry/organisation-sector emphasis tend to highlight pressures upon particular industries, or other classifications of organisation populations, to assume responsibility for broader environmental issues, often revealing factors that enable or constrain responses. For the purposes of this literature survey, contributions on the

dynamics affecting organisation populations are grouped according to their particular emphasis on:

- one or more industrial sectors;
- local government; or
- small and medium-sized enterprises (SMEs).

Contributions that emphasise dynamics affecting organisations in general are reviewed in section 2.2.7.

2.2.5.1 INDUSTRY STUDIES

The level of change perceived necessary for the car industry to become 'sustainable' has made it a popular ground for analysis (eg. Gouldson, 1993; Groenewegen and den Hond, 1993; and Nieuwenhuis, 1996). However, the environmental performance and management efforts of other industries, such as paper (Collins, 1992; Norcia et al., 1993; and Wehrmeyer, 1993); computers (Rodgers, 1995); white goods (Roome and Hinnels, 1993); paints (Meredith and Wolters, 1995); agrochemicals (Nadaï, 1994); oil (Ketola, 1993); and the chemical industry as a whole (Schot, 1992) have also been considered. Cross-sector comparisons of environmental impacts (eg. Polonsky and Zeffane, 1992) have also led to calls for studies of industries that are not popularly associated with major environmental damage - the so-called "silent destroyers", such as academia, financial services and local government (Alabaster and Walton, 1997, after WWF, 1994). However, with the exception of local government (reviewed in the next section), industry-level consideration of the environmental performance of "silent destroyers" has not featured within contributions reviewed in this survey.

2.2.5.2 LOCAL GOVERNMENT STUDIES

Calls for an agenda for the 21st Century[2] made at the 1992 Earth Summit in Rio de Janiero, renewed interest in the concept of Sustainable Development (WCED, 1987) and,

[2] Originally formulated as Agenda 21 and now receiving popular attention as Local Agenda 21, indicating localised attempts to implement Agenda 21 principles.

amongst other outcomes, local government was identified as an institutional tier that should be well-placed to develop local ownership for local environmental improvement (Blowers, 1993). In the UK, attempts by local government to improve the quality of the local environment have always been a popular field of academic study (see, for instance, the specialist journal of Environment and Planning, and contributions such as Goodey, 1974), but initiatives such as Local Agenda 21 and the European Union's Environmental Management and Auditing Scheme (EMAS) appear to have sparked renewed interest (Netherwood and Shayler, 1996).

Some recent contributions have focused on the use of environmental management tools, such as management systems (eg. HMSO, 1993; LGMB, 1992; Netherwood and Shayler, 1996) and environmental auditing (eg. LGMB, 1991; Richards, 1992); and some authors in particular have focused on the contribution Geographical Information Systems (GIS) can make in these areas (Campbell and Masser, 1992; Masser and Pritchard, 1993). Other contributions have considered the extent to which environmental considerations are integrated in local government decision-making processes (eg. Lemon, 1991; and Willis, 1995). The wider role of local government in promoting local environmental initiatives has also been a major research interest (Levett, 1996), with some studies emphasising relationships with local communities (eg. McNaghten et al., 1995), or with local SMEs (eg. Shayler, 1996).

2.2.5.3 SMALL AND MEDIUM-SIZED ENTERPRISE STUDIES

Although there is no single definition of a small or medium-sized enterprise, the importance of SMEs to the world economy is widely recognised (O'Laoire and Welford, 1996). SMEs are typically identified based on a combination of a maximum number of employees, annual turnover and annual balance sheet (see, for instance, the UK Company Act 1985; or the EC Recommendation of 3 April 1996); European Union definitions also stipulate a level of independence, ie. not more than one quarter of the SME can be owned by a larger organisation. The prevalence of SMEs and the unique problems and opportunities associated with their size have made them a targeted track for environmental management research.

Several studies have attempted to reveal forces that shape and constrain SMEs' responses to environmental issues. Examples include Winter and Ledgerwood's (1994) investigation in the English West Midlands; Hutchinson and Chaston's (1994) survey of SMEs in Devon and Cornwall; Moroncini's (1996) study in the fabricated metal products industry in Belgium; and Welford's (1994b) survey of 102 SMEs in West Yorkshire. Findings have suggested that accessible information and the financial and human resources to comply with environmental best-practice often elude SMEs (Moroncini, 1996; Roberts, 1992, p. 48; and Welford, 1994b). Furthermore, owner-managers of UK SMEs tend to regard the environmental agenda as a threat, rather than as an opportunity (Winter and Ledgerwood, 1994; and Welford, 1994b). O'Laoire and Welford (1996) describe how SMEs tend to regard the prospect of adopting an accredited environmental management system, such as ISO 14000, as daunting; but they highlight benefits that a systematic approach could bring. Hutchinson and Chaston (1994) support the broad view that many SMEs regard the environment as a cost; however, in opposition to O'Laoire and Welford (1996), they suggest that best-practice technology-transfer initiatives may be a more appropriate method of improving SME environmental performance than resource-intensive management system approaches. Shayler's (1996) findings from a 'successful' SME waste minimisation project in Keighley, West Yorkshire, appear to lend support to Hutchinson and Chaston's (1994) call for technology-transfer approaches as "business clubs" are identified as playing a key role in developing and sharing appropriate skills and experience.

2.2.6 CONTRIBUTIONS AT AN INTER-ORGANISATIONAL LEVEL

Relationships between organisations have been emphasised by a number of environmental management contributors, particularly those studying attempts to 'green' supply chains (eg. Morton, 1996; and Paul, 1996). However, relationships that have formed between businesses and Environmental Non-Governmental Organisations (ENGOs) have also received attention (for instance, Bendell and Warner, 1996; and Elkington and Fennel, 1996), as have relationships between businesses and the media over environmental issues (eg. Pinfield and Berner, 1992).

Observations on the exercise of power through inter-organisational relations feature in many of these studies, but the search for mutually-beneficial relationships in response to the environmental agenda is also a popular research theme. One area of emerging interest is "industrial ecology" - an approach in which energy consumption and environmental impacts are reduced by utilising the 'waste' products of one organisation's activities in those of another (Marstrander, 1996). Shayler (1996) describes a related notion with weaker inter-organisational links that he terms a "business cluster"; his classification is based on observations of a group of UK SMEs in Bradford that supported each other on waste management, energy efficiency and environmental reviews. The formation of "industrial networks" between organisations in response to environmental issues also features in a study of attempts to reduce CFC use in Sweden (Östlund 1994), although, in this context, the network of relationships is seen as a "temporary reactive measure", rather than a proactive response.

2.2.7 CONTRIBUTIONS AT AN ORGANISATIONAL LEVEL

Dominant themes at this popular level for contributions include dynamics influencing organisations to attend to the environmental agenda; the nature of responses that organisations could or should adopt; and their efforts and progress to date. Amongst contributors there is broad agreement that pressures on organisations to attend to the environmental agenda are growing (Conrad, 1995; Spedding, 1996; Stead and Stead, 1992; and Welford, 1995). Legislation is frequently identified as organisations' most compelling influence (Jones, 1994; Spedding et al., 1993), but most contributors highlight pressures from a range of parties who have an interest in the activities of organisations, including investors (Stead and Stead, 1992), customers (Irvine, 1989; Elkington et al., 1991; and Vandermerwe and Oliff, 1990), neighbouring communities (Smith and Elliot, 1992) and environmental campaigners (Neale, 1996). The notion of stakeholders is a popular device for categorising the variety of pertinent interests and influences with which an environmental manager must contend (Brophy et al., 1996; Clarkson, 1995; IBM, 1995; Stead and Stead, 1992), and Clarkson embraces the conceptualisations of many when he defines the term stakeholder as:

> "... persons or groups that have, or claim, ownerships, rights or interests in a corporation and its activities, past, present, or future. Such claimed rights or interests are the result of transactions with, or actions taken by, the corporation, and may be legal or moral, individual or collective. Stakeholders with similar interests, claims or rights can be classified as belonging to the same group: employees, shareholders, customers, and so on." (1995, p. 106)

Consideration of actual and possible responses to increasing pressures from stakeholders to attend to the environmental agenda, provides the focus for most environmental management contributions aimed at organisations. Many texts on the subject provide argument as to why organisations should embrace environmental management, with a rationale usually being presented in terms of a combination of moral responsibility, legal duty and opportunities for improved competitive position (see, for instance, Porter and van der Linde, 1996; Shrivastava and Scott, 1992; Stead and Stead, 1992; and Welford, 1996a). Authors, such as Little (1991) and Winter and Ledgerwood (1994), who emphasise opportunities for competitive advantage, often present their arguments using the language and models of Michael Porter's classic work on competitive strategies (Porter, 1985), and they tend to highlight examples of organisations that have improved resource productivity by attending to the environmental agenda. In particular, the 3M Company and its Pollution Prevention Pays (3Ps) Programme is a commonly-cited example (Porter and van der Linde 1996, pp. 66-7; Stead and Stead 1992, pp. 178-9).

Contributions on the search for ways to gain improved market position and improved environmental performance are also common place (eg. Hukkinen, 1995; Peattie, 1995; and Vandermerwe and Oliff, 1990); however, the notion that "win-win" solutions for business and the environment are just waiting to be uncovered is not universally shared (see, for instance, Walley and Whitehead, 1996; or Welford, 1996b). Some authors advocate a total re-think of the principles on which modern business is founded if organisations are to respond genuinely to the challenge of sustainable development (Peattie, 1996).

Contributions that emphasise efforts that organisations are making to respond to environmental opportunities and pressures tend to present either exemplar cases or cases that provide opportunities to learn from undesirable outcomes. Welford's (1994c) study of the Body Shop is a good example of the former, whereas Neale's (1996) analysis of the controversy surrounding Shell UK's plans for disposal of the Brent Spar oil platform, or Mitroff and Linstone's (1993) analysis of Union Carbide and the Bhopal catastrophe, are examples of the latter. Revealing barriers to progress is another popular theme in published case studies and Eden's (1994) account of the lack of trust that businesses face when they try to communicate environmental information to customers, is a good example of this.

These and other published studies have contributed to a debate about an emerging recipe for successful environmental management in organisations. This debate has emphasised the importance of an holistic approach (Hopfenbeck, 1993; Stead and Stead, 1992) based on the systematic application of appropriate tools and techniques. These tools and techniques include auditing (Carter et al., 1995; Spedding et al., 1993); information technology (Broughton, 1996; Kuzmin and Solovyov, 1993; de Pablo et al., 1994; and Stubbs M., 1996b); management systems (Netherwood, 1996; Stubbs A., 1996; and the journal of Total Quality Environmental Management); and lifecycle assessment (Linnanen et al., 1995; Pidgeon and Brown, 1994). Other recurrent themes include the importance of innovation, particularly for the development of clean technologies (Genus, 1993; Green and Miles, 1996; Irwin and Hooper, 1992; van Someren, 1995); risk management (Matten, 1995; Rao, 1995; Smith and Elliot, 1992); and regular evaluation of environmental performance (Hocking and Power, 1993; and Lee and Green, 1994).

Whilst most authors agree that it is important to make environmental performance explicit, the methods for achieving this are the subject of intense debate (see, for instance, Azzone and Manzini, 1994; Daley and Cobb, 1989; Gray et al., 1993; James, 1994; Pearce et al., 1992; Welford and Jones, 1996; or Zeffane and Polonsky, 1994). Some see the debate in terms of developing a new direction for the accounting profession (eg. Gray et al., 1993; Pearce et al., 1992); others see opportunities to strengthen the rationale for environmentalism by demonstrating that business performance and environmental

performance are linked (eg. Guimaraes and Liska, 1995). Other authors have chosen to focus on ways organisations can share information about environmental performance with concerned parties, particularly through corporate environmental reporting (Brophy et al., 1996; Gray, 1996; Holland and Gibbon, 1996) or through more interactive forms of stakeholder dialogue such as "partnership workshops" (Johnson and Cupit, 1996).

Whilst the tools and techniques of environmental management are acknowledged as being in their infancy by their proponents, at least one assessment of the adequacy of the current recipe for environmental management suggests that current approaches under-emphasise the need for adaptivity, an essential ingredient for meeting the challenge of sustainable development (Lewis, 1996).

Following a distinction drawn by Chakravarthy and Doz (1992) in their analysis of strategic management, and by Walsham (1993) in his analysis of information systems, it is useful to note that many of the contributions reviewed above have focused on the *content* of environmental management approaches; of equal importance are those contributions that emphasise the *process* by which organisations adopt the philosophy and practice of environmental management. This process is often referred to as "corporate greening" (Smith, 1992) and the work of leading contributors in the area was analysed by a group from Helsinki in 1994. At the time, Keijo Räsänen and colleagues identified five main strands in emerging descriptions of "corporate greening", each distinguished by their portrayal of the process as either:

- strategic choice;
- reform in strategic management;
- organisational change;
- fundamental change in ethical values or culture; or
- institutional change.

(after Räsänen et al., 1994)

More recently, researchers have portrayed the process of "greening" as a learning process (Neale, 1996; Post and Altman, 1994) involving a "paradigm shift" for organisational actors (Halme, 1996; Ledgerwood, 1996; Stead and Stead, 1992). Indications of a move

towards conceptualisations of "greening" as a learning process are detectable in the work of Räsänen et al. (1994), who also argue that the *context* in which the process takes place is worthy of study:

> "We believe that there exists diversity in the change processes and this diversity significantly influences the outcomes of the processes. In other words, the bias towards rationalistic and cognitive, top-down conceptions of greening should be complemented with more process-oriented and interactive views of greening in which the local institutions and the actors' ability to modify these institutions through learning and skilled social reconstruction is acknowledged.
> We further believe that it is the contextual differences that will generate diversity in the ways of solving environmental problems and in the utilisation of related opportunities ..." (p. 15).

Recently, several authors have emphasised attributes of the *context* in which the "greening" process takes place, particularly the organisation's culture (Holt, 1996; Wehrmeyer and Parker, 1995; Welford, 1993) and its responsiveness to change (Skidmore, 1995). However, Räsänen et al.'s (1994) call for frameworks that link the content, context and processes of "greening" is still largely unanswered:

> "... it would be interesting to know what is actually changed, in what direction and how ? What kind of varieties exist in these change processes ? And why ? Therefore we need to develop concepts and frameworks which are able to differentiate between the various shades of green and paths of greening" (p. 15).

A major contribution of this work will be to identify and to demonstrate the use of a conceptual framework that can link the content, context and processes of environmental management. (Section 2.4.3 provides more detailed consideration of the challenges posed and pointers to possible avenues for inquiry.)

2.2.8 CONTRIBUTIONS AT A PERSONAL LEVEL

Individuals' perceptions of their environment and the link between their perceptions and their actions are major research themes at this level. Environment perception research is not new (see, for instance, the work of Downs and Stea, 1977, on "cognitive mapping"), but it seems to be receiving renewed attention as awareness of environmental issues appears to be increasing in the industrialised western world (Steel, 1996).

Research on public perceptions of the environment tends to be dominated by quantitative approaches, such as opinion polls and attitude surveys (see McNaghten et al.'s, 1995, comments on research in the UK; or Steel's, 1996, review of research in the United States). Although there is much debate, particularly in literature on social psychology, about the link between the perceptions, expressed attitudes and exhibited behaviours of individuals (Easterby-Smith et al., 1991; Gilbert, 1993; and Steel, 1996, provide summaries), researchers have not been deterred from exploring attitude-behaviour relationships in an environmental context. Steel (1996) suggests that findings from the US "lend some empirical support to the notion that many citizens are indeed 'thinking globally and acting locally'" (p. 34). In contrast, McNaghten et al.'s (1995) review of UK research reveals problems with people's "sense of 'agency'", in particular their lack of it; they also highlight considerable confusion over the validity of scientific information and note a mistrust of responsible institutions and officers. They argue that whilst quantitative surveys help to highlight people's expressed concerns, qualitative examination of individual perceptions of the environment is necessary to gain deeper understanding of the dynamics of those concerns:

> "... there is an emerging recognition that such 'quantitative' research tends to focus largely on surfaces and fails to deal adequately with people's ambivalences. It also leaves largely unaddressed the question of any wider social or political significance of environmental concern in western industrialised societies like the UK" (p. 14)

Views on the nature of individuals' perceptions of their environment differ, but the concept of 'process' as a key epistemological device for linking significant environmental

phenomena over time and across space, is widely used in qualitative perception research (Lemon, 1991). As Downs and Stea (1977) write:

> "Information linking time and space plays a dual role in everyday spatial behaviour - as a basis for *interpretation* and as source for *predictions*."
> (p. 119, italics in original)

Although the cognitive framework that individuals use to interpret their environment may be similar, a recurrent theme in environmental management research is that individuals' perceptions of significant phenomena and processes in their environment can be extremely varied (Hugget, 1994; Lemon, 1991; Levy and Synnott, 1993). Stead and Stead, for instance, highlight the role that values play in shaping the way people receive and respond to environmental information:

> "People can only view the world through their perceptions. Perceptions result from complex mental processes that involve applying values to environmental elements. Thus to a large extent, values structure the mental pictures that, in turn, determine what individuals pay attention to and what actions they take."
> (Stead and Stead, 1992, p. 73)

The simultaneous ability "to see and not see" (Morgan, 1986), conferred by individual "appreciations" of situations (Vickers, 1968), can manifest itself as conflict (Kantola, 1995; Tribe et al., 1976), particularly as conflicting perceptions of risk between experts and between experts and the public (Irwin, 1985; Portney, 1991; Smith, 1991; Smith and Elliot, 1992; Wynne, 1994).

Research that emphasises individual understanding of environmental information has revealed problems arising from variety in individuals' perceptions of their environment (eg. Eden, 1994). Differing perceptions of 'relevant facts' (Checkland and Casar, 1986), inherent difficulties in visualising the time and geographical scales argued to be necessary for assessing environmental effects, and the sheer complexity of environmental issues (Chechile, 1991), combine to make interpreting environmental data far from easy.

"Environmental problems are less easily simplified than others. ... the elements in an ecological system are highly interconnected; the consequences of action are difficult to determine and more difficult to evaluate. ...

Second, in addition to greater scope, environmental decisions frequently have a greater degree of incertitude. In many cases we simply do not have a thorough scientific understanding; we are unable to predict or envisage all the possible outcomes or consequences." (Chechile, 1991, p. 11)

At least one specialist journal has emerged to address the problematic nature of environmental information provision, the International Journal of Environmental Education and Information. In a typical contribution to this journal, Shallcross (1996) invites reflection upon how developing environmental understanding involves "affective education" - the education of feelings and emotion - as well as efforts to impart information:

> "In the end, the dynamic nature of epistemology, ideology, values and theories of the environment and how we teach about it may mean that all we can achieve is a momentary compromise. But compromise is an emotional as well as intellectual process." (p. 132).

Whilst some, like Shallcross, comment on the process of developing a philosophy and practice of environmental management on a personal level; others, such as Lemon and Longhurst (1996); Mitroff and Linstone (1993); Ornstein and Ehrlich (1990); Stead and Stead (1992), have chosen to speculate on what the content of such a philosophy might include. Stead and Stead (1992) identify "five instrumental values for strategic managers who wish to make their decisions based on sustainability - wholeness, posterity, smallness, quality and community" (p. 129). Mitroff and Linstone (1993) share Stead and Stead's emphasis on holism, presenting argument for "Unbounded Systems Thinking" (UST) which transcends perspectives that are grounded in particular disciplines of inquiry. They argue that:

> "Because all problems are invariably linked with one another in complex ways, we can take this as an excuse for hopelessness and helplessness. However, we can also view it as an opportunity, as a sign of hope. The fact that all problems invariably involve one another does not mean as the simpleminded critics of UST often imply that 'one must know everything before one can know anything.' Instead, the unboundedness of all problems, of all systems, can be construed as an opportunity and a challenge to perpetually enrich our knowledge of the world." (pp. 109-10).

2.3 DISCERNING RECURRING THEMES IN THE LITERATURE

The environmental management literature review undertaken above is intended to be illustrative rather than exhaustive, however it demonstrates clearly that published work is diverse in approach, emphasis and underlying philosophy. This review, and others undertaken by Conrad (1995), Räsänen et al. (1994), Roberts (1992) and Underwood (1995), have identified environmental management as a field that is still in the process of establishing itself. Roberts concluded, in 1992, that the literature had achieved its first objective of raising awareness of environmental issues amongst organisational decision-makers and now needed to address this community's shortfall in knowledge on how to improve environmental performance. Later, in 1994, Räsänen and his colleagues invited the field to reflect on the extent to which the assumptions shaping its development were likely to produce research that was 'in tune' with the needs of practitioners; a point also made in Conrad's (1995) call for environmental management researchers to give greater attention to "reflection, contextual intervention and systemic discourse" (p. 60). Underwood (1995) too emphasises the importance of the 'users' of environmental management research by highlighting the need for "research into the processes by which the results of such research are used" (p. 245). In the language of this research study, these literature reviews are calling for environmental management research with a greater 'sense of audience'.

Chapter 1 set out 'sense of audience' as a core principle of this research study; the specific methodological implications of this will be developed into a framework for guiding the research process (in Chapter 3). To augment the strategic guidance this

framework will provide, it is also important to highlight key substantive concepts that have been emerged from the literature survey to inform the research process. In other words, it is now appropriate to formulate an initial research agenda. A critique is therefore presented of recurrent themes, discernible in the contributions reviewed, that are of particular relevance to this investigation of how organisational actors deal with complex environmental issues. The sections that follow indicate clearly how the initial research agenda for the study relates to those themes.

2.3.1 DYNAMIC COMPLEXITY

It is apparent from the literature reviewed that environmental issues present complex and emergent problems for organisational actors who assume responsibility for dealing with them. The survey has thus confirmed the intuitive choice of environmental management as a suitable setting for exploring how organisational actors deal with complex issues, made in Chapter 1.

The dynamic complexity actors face is portrayed as a continually emerging outcome of the "interconnectedness" of a multitude of social and natural processes operating at different temporal and spatial scales (Chechile, 1991; Mitroff and Linstone, 1993; Allen, 1991). As this study seeks to investigate how actors deal with complex issues, the way in which organisational actors approach interconnectedness will clearly be an important avenue of inquiry. Moreover, this would be consistent with Born and Sonzogni's (1995) call to recognise the "interconnective dimension" of environmental management, that

> "... specifically addresses interrelationships and linkages among physical, chemical, and biological processes and components; among multiple, cross-cutting, and often conflicting resource uses; among the many entities that collectively comprise the community of interest." (p. 170).

Authors who have considered how organisational actors approach interconnectedness have suggested that it is important to recognise limitations in attempts to reduce

continually-emerging environmental issues into bounded problems for which solutions can be found:

> "What we may call environmental problems are an immediate consequence of such an [reductionist] approach, and indeed of any narrow rationality. The basic reason is simple - there is no such thing as the environment. All there is are nested, dynamic, spatio-temporal structures resulting from a continuing evolutionary process. Decisions almost always have consequences which go beyond the time frame or the situation boundary initially considered by the decision maker." (Allen, 1991, p. 378).

Proponents of holistic approaches to environmental management argue that conceptualisations of dynamic and complex situations as problems to be solved are merely 'snap-shots' from particular perspectives:

> "Decisions are made for specific problems, and problem definition ultimately puts bounds in space and time, on what is of interest to decision makers."
> (Levine, 1991, p. 48).

In cautioning against reductionist approaches, authors highlight dangers in unchallenged conceptualisations of environmental problems, citing examples of poorly-framed problems in which thematic, spatial and temporal boundaries implicit in the problem-definition meant that far-reaching, significant consequences were not considered (see, for instance, Mitroff and Linstone's, 1993, consideration of the Bhopal catastrophe, or Lemon's, 1991, study of land-use planning in a rural community). Revealing and encouraging reflection upon mental models of environmental issues that organisational actors use to guide their actions will thus be an important element on the research agenda for this study.

2.3.2 STAKEHOLDERS

Section 2.2.7 described how organisations were coming under increasing pressures to attend to environmental issues from a range of concerned parties. The section also noted

frequent use of the term stakeholders as a conceptual device for categorising perceived variety in the agenda of concern of those with assumed interests in an organisation's activities. The literature survey also indicated that organisational actors regard stakeholder pressure as the major influence on their response to environmental issues. It is clear, therefore, that the term contributes significantly towards a vocabulary for discussing the rationale behind actors' response to complex environmental issues. Indeed, Mitroff and Linstone (1993) suggest that the concept actually facilitates reflection upon organisational actors' assumptions about pressures that influence their actions and plans:

> "Generating stakeholders is a concrete way of getting at assumptions. Most persons cannot generate assumptions directly. They are too vague, too hazy, too hidden from view. Asking people, on the other hand, to list the set of actors, parties, and so on who are affected by one's actions is both a concrete and easily accomplished task."
> (p. 146).

In using the vocabulary of stakeholders to discuss the rationale for their response to environmental issues, organisational actors are involved in a process of *identification* of pertinent groupings and of assessing the relative *significance* of the groupings they have made. Whilst generic stakeholder groups, such as regulators, investors and consumers, appear regularly in environmental management texts, organisational actors must make situation-specific judgements on the constitution and relative importance of pertinent stakeholder groups for environmental management initiatives that they have assumed responsibility for.

The extent to which actors' assumptions about stakeholders are in tune with the diverse and changing interests that those assumptions attempt to categorise is a major avenue of inquiry for qualitative environmental management research (see section 2.2.4). It is also a theme that will feature in the research agenda for this study. The concept of stakeholders provides a rich and revealing vocabulary that organisational actors can use to reflect upon their rationale for environmental management initiatives. Also, the concept can be aligned closely with the principle of 'sense of audience' that guides this study. The

stakeholder concept will thus provide a powerful organising framework for the remainder of this study.

2.3.3 A SENSE OF CRISIS

The previous two sections have highlighted how organisational actors are experiencing increasing pressures to respond to complex and dynamic environmental issues. The sections have also shown that such issues can present emergent, highly-interconnected problems that are not well-suited to bounded analysis. Furthermore, the rates of change of dynamics that are believed to produce significant phenomena in actors' assumed boundaries of responsibility, often vary dramatically and some go well beyond normal decision horizons. It is clear from the debate over global climate change, for instance, that the temporal and geographical scales at which pertinent processes are believed to act pose major challenges for management responses based on measurement. Historical data required for assessing the significance of present observations is not available for many environmental 'problems', fuelling debate over whether recent trends are cause for concern or merely natural variation.

Stead and Stead (1992) highlight fundamental inadequacies in the decision horizons typically used in organisations, arguing that modern industrialised society is currently in an unsustainable stage of development where the capacity to create environmental damage exceeds the ability to recognise that damage is being done:

> "The mental pictures that our ancestors used to comprehend their environment were developed in a very different kind of world than the one that exists today. ... Most of their responses were geared to dramatic, short-term environmental changes. ... They probably perceived gradual global patterns, but had to suppress these perceptions in order to focus on their immediate situations. For most of human history these short-term mental processes were adequate for survival. ... Humans now have the ability to create long-term global changes. Unfortunately, human perceptual processes are still tied to the old world of short-term, dramatic change ... Thus perceiving the impacts of the global changes that are occurring is difficult." (p. 71)

Senge (1990) makes a similar point which he describes as the "core learning dilemma" confronting actors in organisations today:

> "... we learn best from experience but we never directly experience the consequences of many of our most important decisions. The most critical decisions made in organisations have systemwide consequences that stretch over years or decades." (p.23)

Not only are environmental effects typically distant in time and across space from their causes, they are also poorly accounted for in traditional measures of organisational performance (Gray et al., 1993; Pearce et al., 1992). Charles Handy echoes this point, drawing attention to inadequacies in dominant regimes for assessing performance and worth, and suggesting that a new, more balanced, scorecard is required:

> "The first step is to measure whatever can be easily measured. This is OK as far as it goes. The second step is to disregard that which can't be easily measured or to give it an arbitrary quantitative value. This is artificial and misleading. The third step is to presume that what can't be measured easily really isn't important. This is blindness. The fourth step is to say that what can't be easily measured really doesn't exist. This is suicide.
> What does not get counted does not count. Money is easily counted. Therefore, all too soon, money becomes the measure of all things. A just society needs a new scorecard." (Handy, 1994, p. 219).

These illustrative quotes, and the wider literature survey undertaken earlier, have highlighted a growing number of authors who question the suitability of dominant economic, scientific and management approaches for responding to environmental issues. This increasing crisis of confidence deserves analysis as it constitutes an important part of the philosophical background to practical efforts to manage environmental issues in organisations. The question is: how can such an analysis be undertaken ?

The earlier literature survey offers a point of departure. Amongst the authors reviewed, a number used the vocabulary of paradigm shifts to voice their opinions - particularly, Dovers (1994), Halme (1996), Ledgerwood (1996) and Stead and Stead (1992). It is perhaps appropriate, then, to reflect upon growing calls for change using Thomas Kuhn's (1970) classic work that popularised the notion of paradigms.

> "Paradigms gain their status because they are more successful than their competitors in solving a few problems that the group of practitioners has come to recognise as acute." (p.23)

Kuhn argues that a paradigm shift occurs when a group of practitioners finds that current thinking fails to tackle problems which they regard as particularly acute. However, he also notes that paradigms are not apt to be surrendered lightly. Therefore, when change does come, it is likely to "penetrate existing knowledge to the core" (p. 65). Before the paradigm shift, however, practitioners are seen to experience a sense of crisis as they find it increasingly difficult to use existing structures of knowing and doing to deal with problems that are widely regarded as acute.

If Kuhn's theory of scientific revolution is applied to environmental management, it is enlightening to see environmental issues increasingly being portrayed as acute, intractable problems for modern industrialised society (Lash and Urry, 1994). The growing use of environmental legislation and economic incentives can be seen as a response by individuals in authority who have come to recognise those problems as acute. Their efforts are clearly intended to encourage organisations (as the dominant resource allocation mechanism in modern society) to attend to the acute problems they see in environmental issues. However, government is not the only level of society to experience exposure to or, for that matter, to engage in the portrayal of environmental issues as acute problems, and organisational actors are therefore likely to experience a range of pressures from interested parties. In response to the pressures they perceive, some organisational actors will assume responsibility for dealing with problems highlighted by the focus on environmental issues. However, they are likely to experience a sense of crisis as they respond to new responsibilities in terms of the past, drawing on existing organisational

structures and decision horizons to tackle issues that transcend the boundaries that those structures and horizons assume. Although actors may recognise that existing information systems, resource allocation mechanisms and operating norms are poorly suited to dealing with complex and emergent environmental issues, it is against the current 'scorecard' that environmental management initiatives must be justified if they are to receive support. Actors will thus find it extremely difficult to take existing structures for granted as they attempt to fulfil the new responsibilities that they have assumed.

As the previous paragraph demonstrates, the paradigm concept and particularly the growing sense of crisis that heralds a fundamental shift, appear to offer a powerful framework for interpreting the literature reviewed. They will therefore be important elements on the research agenda for exploration in the field.

2.3.4 LOTS OF DATA BUT LITTLE INFORMATION

This critique of key themes has so far established that organisational actors face difficulties in deciding how to deal with environmental responsibilities that they have assumed. Such difficulties have sometimes been conceptualised in the literature as information problems. Indeed, EU Environmental Policy has identified the provision of environmental information to decision-makers at all levels in society, as a key mechanism for improving the environmental performance of organisations (Stubbs, 1995; Welford and Gouldson, 1993). However, as section 2.2.8 highlighted, it is not an easy task to communicate environmental information that recipients regard as meaningful. Environmental information initiatives are frequently criticised for seeking to improve the supply of information without attending to demand (Burton, 1989; Hooper and Jenkins, 1995; Stubbs, 1995), providing 'lots of data but little information' (Bocock, 1996; Laane and Ten Brink, 1990).

In considering how organisational actors can be provided with the information they need to carry out their environmental management responsibilities, a host of research questions are generated. For instance, what are the nature of the environmental management responsibilities ? What constitutes suitable data and from where might such data be

collected ? How should environmental data be presented if they are to be considered meaningful and relevant by those with management responsibilities ? In answering these questions the research is forced to confront the dynamic complexity, notions of stakeholders and sense of crisis, highlighted in the previous three sections. The theme of an environmental information problem, particularly how to integrate environmental data to produce meaningful insights, is thus adopted as a point of departure for the fieldwork to follow (see Chapter 4).

2.3.5 INTEGRATED MULTI-PARTY APPROACHES

So far the themes identified in this critique have largely helped to characterise the problem space of environmental management. It is therefore now appropriate to consider possible attributes of an associated solution space. Section 2.2.7 reviewed contributions towards a recipe for environmental management and noted an emerging consensus around the importance of holistic and flexible approaches that emphasised stakeholder participation. These articulations of environmental management portray dialogue with stakeholders as a mechanism for achieving consensus about diversity. Building consensus regarding significant variety in pertinent perceptions that management programmes need to be 'in tune' with, and capable of responding to, is seen as an important area of development for environmental management approaches (Born and Sonzogni, 1995; Peattie, 1995; and Selin and Chavez, 1995). However, those who point the way towards integrated, multi-party approaches to environmental management also highlight the degree of change such approaches are likely to involve:

> "Organisational boundaries must become more permeable, perhaps even dissolve. Interdisciplinary teams will demand new approaches for managing and motivating people. New technical and interaction skills must be developed. New power-sharing and accountability procedures need to be established, along with interactions with a wider array of interests. In short, significant adjustments in organisational practices and cultures will be essential to carrying out IEM [Integrated Environmental Management] programs and projects." (Born and Sonzogni 1995, p. 177)

It is clear that the proponents of integrated, multi-party approaches believe that they embody attributes of a solution space for environmental management. However, these proponents also acknowledge that the concepts and theories in their approaches need to be enriched with practical experience if they are to be developed further. By placing an exploration of opportunities for integrated, multi-party approaches on the research agenda for this study, it is hoped that these concepts will not only facilitate interpretation of the fieldwork, but also the fieldwork might contribute towards the emerging conceptualisation of integrated, multi-party environmental management.

2.3.6 RELATIONSHIPS BETWEEN PERCEPTIONS, STRUCTURES AND ACTIONS

Chapter 1 set out the aim of this study as producing a contribution to knowledge on how organisational actors deal with complex issues. In so doing, a process orientation has been adopted for the study in which the *process* of dealing with complex issues is in the spotlight. Furthermore, it is the role of organisational actors in this process that is the key focus.

The preceding literature survey highlighted the view that understanding of processes through which individuals respond to environmental issues necessitates research that penetrates surface impressions (Lemon, 1991; McNaghten et al., 1995). Section 2.2.8 expanded upon this point in its review of contributions focused particularly on individual actors, revealing linkages between perceptions and actions as a dominant research theme at this level. Although qualitative perception research in an organisational context was found to be limited, synthesis of relevant studies suggests that the way in which organisational actors perceive environmental issues, the priorities they assume, and their perceptions of the organisational structures available for responding to the issues, can all be important influences upon actions taken (Peattie and Ringler, 1994; Post and Altman, 1994; Smith, 1992; Wehrmeyer and Parker, 1995; Welford, 1993 and 1994b; and Winter and Ledgerwood, 1994). Welford (1993), in particular, urges practitioners and researchers to consider the influence of organisational context - particularly culture and management paradigms - on efforts to improve environmental performance:

> "Rethinking business strategy along the lines of sustainable development does require a change in corporate culture ... Many of the issues will necessarily challenge the very foundations of the system which we too often see as immovable and will therefore be opposed by vested interests." (p. 32)

It is therefore clear that relationships between the process of dealing with environmental issues and the context in which that process is situated, deserve to be explored in this study. The weaknesses of the current literature in this regard have already been noted and the methodological implications of identifying a suitable theoretical framework for exploring such relationships are examined further in section 2.4.3. However, it is also clear that it is the individual actors' perceptions of the contexts for responses that must be elicited as part of the research agenda for this study.

It is only by penetrating the complex and subtle contexts in which organisational actors orchestrate their responses to environmental issues, that a grounded contribution on the process of responding will be forthcoming.

2.3.7 REFLECTION ON THE RESEARCH AGENDA PRODUCED

The research agenda of substantive themes raised during the preceding critique has considered the nature of problem and solution spaces for managing complex environmental issues. It has also placed its focus firmly upon organisational actors, particularly on linkages between their actions and their perceptions of the structures that produce and are reproduced by those actions. The six substantive themes identified constitute an initial agenda, or 'going in' position, for a research process that sets out to produce a contribution to knowledge on organisational actors' dealings with complex issues. In order to increase the chances of success for that research process, the final section of this chapter considers specific methodological challenges that the research will have to overcome.

2.4 METHODOLOGICAL CHALLENGES

Although many of the published studies surveyed did not devote much attention to the methodological choices and challenges they had faced, three key challenges for this study can be discerned:

- Transcending Traditional Disciplinary Boundaries;
- Being Aware of One's Role in Shaping the World being Studied; and
- Identifying Theory for Linking the Content, Context and Processes of Environmental Management.

These are now explored below.

2.4.1 TRANSCENDING TRADITIONAL DISCIPLINARY BOUNDARIES

This chapter has established that environmental issues pose complex and emergent problems for organisational actors who assume responsibility for dealing with them. Furthermore, it has demonstrated that these complex problems are not well-suited to bounded analysis and has highlighted growing calls for responses to be informed by insights from a range of disciplines:

> "... no complex problem can be solved by paying attention to only one facet of the problem, no matter how important it is. The study of complex problems must be multidisciplinary, and solutions must weigh a number of factors"
> (Mayer and Cortese 1991, p. vii)

However, in his review of environmental management research in Germany, Conrad (1995) observes that few efforts towards interdisciplinary inquiry have so far taken place:

> "Research on environmental management is dominated by the application of categories and models from (classical) microeconomics and from innovation theory to the environmental dimension. Although other disciplines and theoretical approaches - for instance, psychology, ethics or systems theory - are not considered mutually exclusive, but supplementary, they do not yet play an important part." (p. 53).

One possible reason for the limited extent of multi-disciplinary inquiry in environmental management, is that whilst it might be considered desirable, it can require considerable commitment to achieve (Chechile and Carlise, 1991). Piecing together insights from different disciplines to create a coherent whole can be difficult, but a possible way forward has been identified in systems thinking (Lemon and Longhurst, 1996; Mitroff and Linstone, 1993). Systems theory has been used explicitly and in its entirety for sharing disciplinary insights by some studies (see, for instance, Hindle et al., 1995); whereas constituent concepts such as processes and boundaries have been used implicitly as epistemological devices for achieving a similar purpose by others (for instance, Hadfield and Cannibal, 1996).

If this research study is to provide a multi-dimensional contribution on the management of environmental issues, it must first recognise the value of gathering insights from different perspectives. It must then seek to develop a feasible way of blending these insights to produce a richer understanding of the whole picture. To facilitate this integration, a set of epistemological devices has been identified - systems, processes and boundaries - that, together with the points made earlier in this section, will inform the development of an appropriate research strategy for this study. That strategy is introduced in the following chapter.

2.4.2 BEING AWARE OF ONE'S ROLE IN SHAPING THE WORLD BEING STUDIED

A second methodological challenge highlighted by other environmental management researchers concerns the role of the researcher and the dynamic nature of the organisational contexts in which environmental issues are dealt with.

The introductory paragraphs in section 2.3 revealed growing calls for researchers to provide more useful and accessible knowledge to practitioners, and to conduct their activities with a heightened sense of audience. The dynamic nature of organisational settings was also highlighted as a particular problem for understanding processes of

"greening" (Räsänen et al. 1994). Indeed, several authors called for longitudinal studies to capture more fully the essence of the dynamics at work (Lewis, 1996; Selin and Chavez, 1995).

In considering pathways towards more useful and relevant environmental management research, a number of authors urge consideration of action-research approaches (Conrad, 1995; Levy and Synott, 1993), in which researchers make a feature of their interactions with, and their consequences for, the organisational setting they are studying (Susman and Evered, 1978). Other authors invite greater consideration of how research findings will be used by practitioners (Goodey, 1974; Underwood, 1995). This point is well illustrated in Goodey's (1974) reflections upon environmental planning research, particularly in his call to researchers not to lose sight of their original aim of improving the planning process:

> "The recipe 'take from the people information, stir with social science techniques, and serve lukewarm to the planners' is no longer acceptable. All too often the social scientist's intervention in the decision process inhibits rather than facilitates communication - hardly a desirable situation where 'participation' is a mandatory element. ... But finding the role of and operating as a 'facilitator' for the exchange of information between designer and designed for is not easy. It runs counter to much of the training and requires skills in communication." (p.120).

Here Goodey (1974) highlights how an environmental researcher can face new challenges when efforts to remain detached from the processes under investigation are abandoned. These new challenges stem from being an active participant in the world being studied, and necessitate deep reflection on contextual intervention (Conrad, 1995, p. 60). The nature of these challenges are explored more fully in the following chapter which develops a strategy to guide environmental management research that seeks to enhance its sense of audience through participation.

2.4.3 IDENTIFYING THEORY FOR LINKING THE CONTENT, CONTEXT AND PROCESSES OF ENVIRONMENTAL MANAGEMENT

The concluding paragraphs of section 2.2.7 highlighted problems with the current lack of a recognised theoretical framework for describing the development of environmental management in organisations. However, it is enlightening to note that environmental management literature is not alone in facing such criticism. The need for a coherent framework that adequately accommodates pertinent aspects of the organisational setting in which findings are grounded, has also been identified in other emerging fields of organisational research, particularly, information systems (Markus and Robey, 1988; Walsham, 1993; Walsham and Han, 1991). Indeed, strong parallels can be drawn between information systems and environmental management. Both fields of inquiry are generally regarded as fast moving, and core terminology and theoretical frameworks are far from being well established. To illustrate this latter point, critiques of the environmental management literature reviewed at the start of section 2.3, can be contrasted with Markus and Robey's (1988) attempt to move debate about information systems (IS) research away from theory content and towards theory structure:

> "It is no secret that research on information technology and organisational change has produced conflicting results and few reliable generalisations. ... We suspect that greater use of theoretical structures which emphasise empirical fidelity will stimulate more and better research on these phenomena." (p. 596).

Walsham and Han's (1991) observations on the state of IS research strike a similar chord:

> "... despite the growing literature in the area of socially-focused IS research, there remains a shortfall of a well-grounded theory and methodology on how to address the social and organisational aspects and issues of relevance to information systems." (p. 77).

Within the IS literature several contributors have attempted to address the lack of an organising framework for the development of new systems of work within organisations.

Particular approaches of note have been based on systems theory (Checkland, 1992a) and on Giddens' (1984) theory of structuration (Walsham, 1993; Walsham and Han, 1991; Orlikowski and Robey, 1991; Orlikowski and Gash, 1994).

Checkland's arguments on the value of systems thinking for investigating problems of organisational development, have led to the development of a sophisticated methodology for considering interventions. This methodology is known as soft systems methodology, or SSM (Checkland, 1981 and 1988). SSM has now been used on a number of occasions as an action-research methodology for understanding the development of IS in organisations (see, for instance, Cottam, 1990). Recently, its potential for environmental management has also been highlighted (Levy and Synnot, 1993). However, it is not yet an established part of the vocabulary for describing environmental management initiatives.

The lack of an established framework for sharing insights on environmental management which recognises the influences of the setting in which those insights were grounded, is clearly a problem for a research study that adopts the guiding principle of a sense of audience. However, it is a problem that must be solved if this study is to make a contribution to knowledge. Indeed, a major part of its contribution to knowledge is likely to arise from the way it deals with this problem. The strong analogy with information systems drawn in this section, points to potential avenues of enquiry for a suitable framework for linking the content, context and processes of environmental management. These avenues will be explored more fully through the fieldwork and in Chapter 8's interpretation of findings.

2.5 SUMMARY

This chapter has undertaken an illustrative review of contributions to the emerging field of environmental management. In so doing, it has confirmed that environmental management constitutes a suitable focus for investigating how organisational actors deal with complex issues.

Reflection upon the relevance for this particular study, of themes revealed in the literature survey, has led to the formulation of an initial research agenda. That research agenda invites consideration of:

- Approaches to dynamic complexity;
- Notions of stakeholders;
- An apparent sense of crisis;
- Problems of lots of data but little information;
- Opportunities for integrated, multi-party approaches; and
- Important linkages between perceptions, structures and actions.

Table 2-1 Initial research agenda

Finally, in order to improve the chances of success for the study, the chapter has highlighted methodological challenges faced by previous environmental management researchers, particularly:

- Transcending disciplinary boundaries;
- Being aware of one's role in shaping the world being studied; and
- Identifying theory for linking the content, context and process of environmental management.

Table 2-2 Methodological challenges

A detailed response to issues raised in this chapter that relate to the research process, is now developed in Chapter 3.

3. RESEARCH STRATEGY

This chapter will introduce a framework to support the process of researching organisational actors' dealings with complex environmental issues.

In recognition of the potential audience for this chapter, the worldview that shapes the research will first be located in the context of established philosophical stand-points. The chapter will then demonstrate that investigating a world which we all interpret differently and which we can never step outside of, necessitates a reflexive, participative approach to research. Clear justification will thus be provided for an adaptive research strategy that accommodates both planned and emergent research opportunities. The chapter will then present an image of the research process as an on-going creative endeavour to operationalise an emerging vision of the research outcome in terms of four interlinked research objectives:

- getting in and getting on;
- gathering data;
- generating theory; and
- communicating findings.

3.1 PERSPECTIVES ON THE PHILOSOPHY AND PROCESS OF RESEARCH

As this research seeks to make an unique contribution to knowledge, a clear statement of its guiding philosophy will enable the reader to appreciate the direction from where it is coming. This will facilitate its location in the context of other studies, enable its coherence to be assessed, and provide a contribution to on-going debates about the conduct of research. As Zuboff (1988) points out:

> "... researchers ought to indicate something about their beliefs, so that readers can have access to the intellectual choices that are embedded in the research effort." (p. 423).

In establishing and articulating the set of beliefs that underpins their work, researchers often reflect upon their position on the nature of the world being investigated (their ontological stance) and on how knowledge of that world may be obtained and shared with others (their epistemological stance). This process of reflecting critically upon a personal view of the world and considering alternative perspectives can be "simultaneously disturbing and stimulating" (Blaikie, 1993), but studies indicate that it is not the only factor to influence the stand-points researchers adopt for their work. Kuhn (1970) provides a classic image of scientific research in which researchers can adopt stand-points either inside or outside of the dominant community of "normal science", highlighting problems that researchers outside "normal science" may face in securing funding to support their work. Blaikie (1993) observes that in the social sciences, this 'single paradigm' image is largely being replaced by "paradigmatic pluralism", but he argues that this places responsibilities on researchers to recognise and to debate their individual stand-points. Morgan (1983) supports this call, presenting an image of research as "reflective conversation":

> "Both [research and conversation] are forms of social interaction in which our choice of words and actions return to confront us in terms of the kind of discourse or knowledge that we help to generate. This feature of conversation can be actively used to explore our favoured approach to research in a way that is constructively critical, in that we systematically attempt to confront and understand the nature and significance of what we do and how we might do it differently. ... The call for reflective conversation to improve social research is not a call designed to promote uniformity so much as to promote improved diversity." (Morgan, 1983, p. 406)

The metaphor of research as 'conversation' invites researchers to reflect upon the extent to which their attempts to share understanding are guided by a 'sense of audience' (Schatzman and Strauss, 1973). As Chapter 1 explained, the notion of 'sense of audience' is a cornerstone of this research project which informs the work at all stages. Here, awareness of the mental models that academic peers draw on to interpret research perspectives should enable meaningful reference points to be used for positioning the work, thus facilitating 'conversation' regarding the path the research has chosen to follow.

It is important to establish that the decision to write this chapter primarily for an academic audience has not been taken to maintain a divide between lay actors and social theorists (Giddens, 1984). Rather, the vocabulary used has been selected to have most resonance for academic peers on the assumption that they are most likely to be interested in the philosophical underpinning of the work.

The notion of research paradigms, popularised by Kuhn (1970), provides a well-recognised framework for positioning individual research stand-points, although some authors caution against unquestioned simplification of such complex philosophical issues. Both Blaikie (1993) and Morgan (1983) highlight temptations to reduce complexity arising from the range and contrariness of relevant literature:

> ... the task of coming to grips with the range and diversity of even the basic literature across these fields of academic endeavour is daunting, if not impossible. A common solution to the problem is to adopt one path from the intersecting maze, one paradigm or theoretical perspective, and travel down it with blinkers firmly in place. Another is to be uncritically eclectic, gathering up and combining bits and pieces of various approaches" (Blaikie, 1993, p. 2).

> "... such diversity begs further simplification and classification in order to make it more manageable and to provide an easy route to understanding. However, this temptation must be resisted ... Classification and simplification can aid understanding, but if interpreted too literally, they exert a confining and diversionary hold on imagination as interest in the classificatory 'map' replaces interest in the 'territory'." (Morgan, 1983, p. 41).

Despite such reservations many authors reduce the complex philosophical field to a tension between two opposing research paradigms, divided by their views on whether the methods of the natural sciences are appropriate for social sciences.

Methods of the natural sciences are appropriate	*Methods of the natural sciences are not appropriate*	
Positivism	Phenomenology	Easterby-Smith et al. (1991)
Positivism	Naturalism	Hammersley & Atkinson (1983)
Functionalism	Interpretivism	Hackney (1994)
Positivism	Action Research	Susman & Evered (1978)

Table 3-1 Opposing research paradigms

Whilst the use of such dualisms to characterise knowledge is strongly criticised by Giddens (1984) and by feminist writers such as Glennon (1983) and Harding (1987), tension between diametrically-opposed positions is viewed by some as a catalyst for generating new understanding (Morgan, 1983). Hegel, for instance, describes a classic structure for advancing knowledge (the *dialectic process*), in which a *thesis* provokes an *antithesis* (its negation) and a *synthesis* (the negation of the negation) emerges from the debate to accommodate features from both points of view (Gaarder, 1994; Pascale, 1990, pp. 142-143). Within the literature on social research, it is clear that debate has been intense regarding the extent to which the philosophy and methods of natural science are appropriate for social science (Blaikie, 1993). Argument between thesis and antithesis has revealed a complex range of issues upon which researchers can consider their position:

Issue	*Alternative Positions*	
Nature of reality	Realist	Constructivist
	Single	Multiple
Starting point	Theory	Observation
	Technical language	Lay language
	Outside	Inside
Role of language	1:1 correspondence with reality	Constitution of social activity

Lay accounts	Irrelevant	Fundamental
	Corrigible	Authentic
	Trans-situational	Situational
Social science accounts	Generalisable across social contexts	Specific in time and space
Researcher	Subject-to-object	Subject-to-subject
	Detached	Involved
	Outside expert	Reflective partner
Objectivity	Absolutist	Relativist
	Static	Dynamic
Theory of truth	Correspondence	Relativist
	Political	Dynamic
Aim of research	Explain	Understand
	Evaluate	Change

Table 3-2 Choices and methodological issues (Blaikie, 1993, p. 216)

This section has sought to confront and to understand the nature and significance of adopting a research perspective and to highlight alternative perspectives that might be adopted. With heightened awareness of the choices involved, the next section will describe the research perspective that underpins this study.

3.2 RESEARCH APPROACH

This research study adopts an ontological stance based on a tangible, continually-changing physical world. From this perspective it is assumed that individuals experience this world through the senses, but this sensory experience can only be understood in terms of structures of interpretation that are produced and reproduced through social interaction. Perceived 'reality' is therefore considered to be context dependent, constructed through an individual's experiences and social interactions. Researchers are thus part of the world they seek to investigate. Their actions are guided by the reality they perceive and they contribute to the process of shaping reality for others with whom they interact. In practice

it is meaningless to consider adopting a neutral observation point, outside of the world being studied, although this does not necessarily decry the theoretical value of such a notion, for instance Spinoza's call "to view things from the perspective of eternity" (Gaarder, 1994).

The epistemological stance for this research assumes interest in a knowledge of processes of natural and social change and of their complex interactions, glimpsed through recognised patterns of observed phenomena, interpreted in terms of individuals' emerging mental models of the world around them, and shared through socially (re)constructed models. Downs and Stea (1977) use the term "cognitive mapping" to describe "the mental process through which people come to grips with and comprehend the world around them" (p. 61). They emphasise that models or maps produced through cognitive mapping are mental "re-presentations" of a complex world:

> "We are talking about something that *stands* for the environment, that *portrays* it, that is both a *likeness* and a simplified *model*, something that is, above all, a *mental image* in a person's brain." (Downs and Stea, 1977, p. 6, italics in the original)

Individuals are thus considered knowledgeable, but this knowledge is inevitably situated and incomplete; individuals can only have anticipations of what the future may hold. Incomplete knowledge may manifest itself as unintended consequences of planned action, particularly if the model which inspired the action failed to accommodate the diverse ways in which the action would be received by others (Giddens, 1984; Lemon, 1991). Furthermore, actors may not be able to articulate all the knowledge which they possess and on which they draw to guide their actions.

For instance, actions regarded as routine may be shaped by knowledge of structures and processes which an individual 'takes for granted'. Zuboff (1988) uses the phrase "natural attitude" to describe this phenomenon, noting how ...

> "... natural attitude ... allows us to assume and predict a great many things about each other's behaviour without first establishing premises at the outset of each interaction.

> ... natural attitude can stand in the way of awareness, for ordinary experience has to be made extraordinary in order to become accessible to reflection." (p. 13).

Downs and Stea (1977) make a similar point regarding spatial knowledge:

> "[W]e are so adept at using this ability to know the world around us that we rarely notice its existence. Knowledge seems to 'come naturally' to us, but, as we shall see later, it does *not*. The only time that the ability comes to our attention is when it doesn't work - that is, when we are lost." (p. 5, italics in original)

Unquestioned assumptions about the way the world is, and an individual's place within it, provide a sense of security and stability (Giddens, 1984), but, as Downs and Stea (1977) note, there may be times when this taken-for-granted knowledge breaks down. The "sense of crisis" resulting from such incidents offers an opportunity for reflection upon knowledge which might otherwise be difficult to access. Zuboff (1988), for instance, describes how she hoped "natural attitude", the "treacherous enemy" of social research, would be caught 'off-guard' when organisational routine was disrupted by the introduction of new technology. She recalls how she exploited a brief "window of opportunity" as organisational actors struggled to develop rules and resources for dealing with novel and complex issues that could not be readily accommodated in existing organisational routine, before a new "crust of familiarity" closed over.

Tacit assumptions which individuals draw upon to negotiate daily life are not the only source of knowledge which this research perspective recognises as important. Through their interactions with one another, individuals are assumed to establish what Giddens (1984) describes as "mutual knowledge" - shared understanding of what things are important to attend to and of how things may be dealt with. Through the later works of Edmund Husserl and the writings of Maurice Merleau-Ponty, existentialist philosophers develop a similar notion: the *Lebenswelt* (life-world)

> "... the world of lived experience, which will have its own peculiar style or structure, according to the social and cultural conditions of those who share it."

(Warnock, 1970, p. 44).

From the perspective on research guiding this work, it is assumed that through their individual experiences, actors develop models of how things are, of how things could or should be, and of how things appear to change, but these models emerge from and re-enter social arenas in which resources are allocated and behavioural norms are maintained. Interplay between perception and action within social arenas is therefore a key interest of research in this tradition. Zuboff (1988), for example, describes the aim of her research in terms of:

> "...understand[ing] the dialectical interchange between human responsiveness ... and what philosophers call the 'life-world' or the 'life-field'. On the one hand, the human body and its responsiveness actively structure the world, but that world in turn shapes and selects forms of human responsiveness. ... While this level of responsiveness provides for individual variation, the constellation of commonly felt meanings can be a powerful critique of a shared situation." (p. 423).

Downs and Stea (1977) use the language of cognitive mapping to make a similar point about individual and shared knowledge:

> "Although we can expect parts of cognitive maps to be similar, we must not forget that representations are constructed to reflect the personal nature of experience and the meaning attributed to this experience. The 'fine' structure of organisation and the detailed contents of maps are expressions of individuality, which are superimposed on the common skeleton provided by similar cognitive capabilities and shared activity patterns." (pp. 104-105).

Researchers have noted how aspects of shared knowledge may become "institutionalised" (Giddens, 1984) or "stabilised" (Star, 1991) in organisational routine, and "embedded" or "crystallised" (Webster, 1991) in artefacts such as computer systems (Morgan, 1986; Orlikowski and Gash, 1994; Walsham, 1993). Smircich (1983) shares this interest in symbolic constructions that are (re)produced through social interactions, and suggests that

"[w]e may borrow the concept of culture from anthropology as an epistemological device to help frame and guide the study of organisations from this point of view." (p. 162). Research in this tradition has exploited actors' abilities to reflect upon and to discuss the motivation for their actions in the various social arenas in which they play a part (Zuboff, 1988; Walsham, 1993), sometimes revealing networks of perceived causation that go well beyond the arena which is the focus of the investigation (Lemon, 1991). Promoting reflective discussion on the interactions taking place in a particular social arena, and on the models and artefacts that are in "circulation" (Callon, 1991; Law, 1992; Murdoch, 1995), is therefore an important goal for research in this tradition.

In summary, research conducted under this perspective assumes an interest in gathering insights about :

- actors' tacit assumptions for negotiating daily life, which may be deeply embedded in social routine and sometimes exposed in times of crisis;
- actors' discursive reflections upon the models (or cognitive maps) that they use to interpret their surroundings and guide their actions; and
- actors' mutual knowledge interpreted from its physical manifestation in systems of work, texts and artefacts such as computer systems.

These insights are gathered with a view to piecing them together to gain understanding of a wider whole that gives meaning to each of the pieces, an endeavour sometimes described as "hermeneutics" (Blaikie, 1993; Giddens, 1984) or likened to rebuilding a fractured hologram (Senge, 1990). Palmer, quoted in Blaikie (1993, p. 29), describes the process thus:

"We understand the meaning of an individual word by seeing it in reference to the whole of the sentence; and reciprocally, the sentence's meaning as a whole is dependent on the meaning of individual words. By extension, an individual concept derives its meaning from a context or horizon within which it stands; yet the horizon is made up of the very elements to which it gives meaning. By dialectical interaction between the whole and the part, each gives the other meaning; understanding is circular." (Palmer, 1969, p. 87)

In order to gather such insights researchers must consider their roles as part of the world being investigated; they must recognise the double hermeneutic of social research (Giddens, 1984). They must also recognise that their knowledge, and the knowledge of those they study, is situated and incomplete. A research approach which addresses these challenges must therefore be:

- 'reflexive and participative' - the researcher 'works with' those he seeks to investigate and must maintain a 'sense of audience' for his actions at all times; and
- 'adaptive' - the researcher must be sensitive to the possibility of unanticipated consequences arising from his own actions, and from the actions of those with whom he works.

Although this research does not seek to perpetuate the dualisms that have divided social science (Blaikie, 1993), it is clear that the worldview which shapes it is most closely aligned with the right-hand columns in Table 3-1 and Table 3-2. The stance adopted draws heavily on Giddens' (1984) notions of routine and the duality of structure, but attempts to address Law's (1991b) criticism of structuration theory for conceiving of structure as purely "memory traces":

> "More often, memories ... are also inscribed in a heterogeneous arrangement of materials that include interactions, texts and other symbolic forms ..."
> (Law, 1991b, p. 183).

The essence of the perspective is perhaps best captured by Walsham's (1993) extension to the work of Markus and Robey (1988), in which he identifies a tradition of information systems (IS) research that seeks to develop "constituitive process theories" that are:

> "... concerned with the processes whereby social actors are engaged in producing and reproducing the social systems which they form part." (Walsham, 1993, p. 244)

Walsham uses Orlikowski and Baroudi's (1991) classification of IS research to clarify this perspective further:

"Orlikowski and Baroudi (1991) ... identify three broad research philosophies ... positivist, interpretivist, and critical. The authors describe the interpretive philosophy of IS research as emphasising the importance of subjective meanings, the need to understand social processes by 'getting inside' them, and the non-neutral stance of the researcher. They describe the critical philosophy of IS research as emphasising the unfulfilled potentiality of people, the way that knowledge is grounded in social and historical processes, and the role of the researcher as being to bring to consciousness the restrictive conditions of the status quo in order to help eliminate the bases of alienation and domination. ... Constituitive process theories ... are ... an attempt to dissolve the boundaries between such traditions, in emphasising not only the importance of subjective meaning for the individual actor, but also the social structures which condition and enable such meanings and are constituted by them."
(Walsham, 1993, p. 246).

3.3 RESEARCH METHOD

Under the perspective adopted for the study, research methods informed by ethnography have many attractions:

> " ... once one recognises the reflexive character of social research, that it is part of the world it studies, many of the issues thrown up by positivism become easier to resolve, and the specific contribution to be made by ethnography emerges more clearly."
> (Hammersley and Atkinson, 1983, p. 3)

In the literature and language of social research conducted in the ethnographic and interpretive tradition (Easterby-Smith et al., 1991; Gilbert, 1993; Hammersley and Atkinson, 1983; Lofland, 1971; Schatzman and Strauss, 1973; Strauss and Corbin, 1990), a set of four inter-linked objectives can be discerned, which must be addressed when conducting research:

Getting in and getting on	identifying suitable research setting(s), negotiating access, and setting actors' expectations of the researcher
Gathering data	observing and engaging in dialogue with pertinent organisational actors, events, texts and artefacts
Generating theory	developing sensitivity to insightful concepts, relationships and movements in the data, and assessing their validity and resonance
Communicating findings	mediating the frames of reference employed by actors in the research setting and those individuals who have an interest in the research themes.

Table 3-3 Inter-linked research objectives

The ordering of these objectives is not intended to imply a strict chronological delineation between activities associated with one objective and another:

> "Negotiating access and data collection are not ... distinct phases of the research process. They overlap significantly. Much can be learned from the problems involved in making contact with people as well as from how they respond to the researcher's approaches" (Hammersley and Atkinson, 1983, p. 56).

Strauss and Corbin (1990) support this contention, arguing for the importance of interweaving data collection and data analysis, and noting how "[e]ach feeds the other thereby increasing insight and recognition of the parameters of the evolving theory" (p. 43). Schatzman and Strauss (1973) have also described how considering communicating findings with a 'sense of audience' can lead to new analytical insights:

> "In preparing for any telling or writing, and in imagining the perspective of his specific audience, the researcher is apt to see his data in new ways: finding new analytic possibilities or implications he has never before sensed." (p. 132)

Together with the vision of developing a constituitive process theory of actors' attempts to deal with environmental issues in an organisational setting, these four inter-linked objectives will provide the guiding framework for the process of choosing and applying research methods in this study.

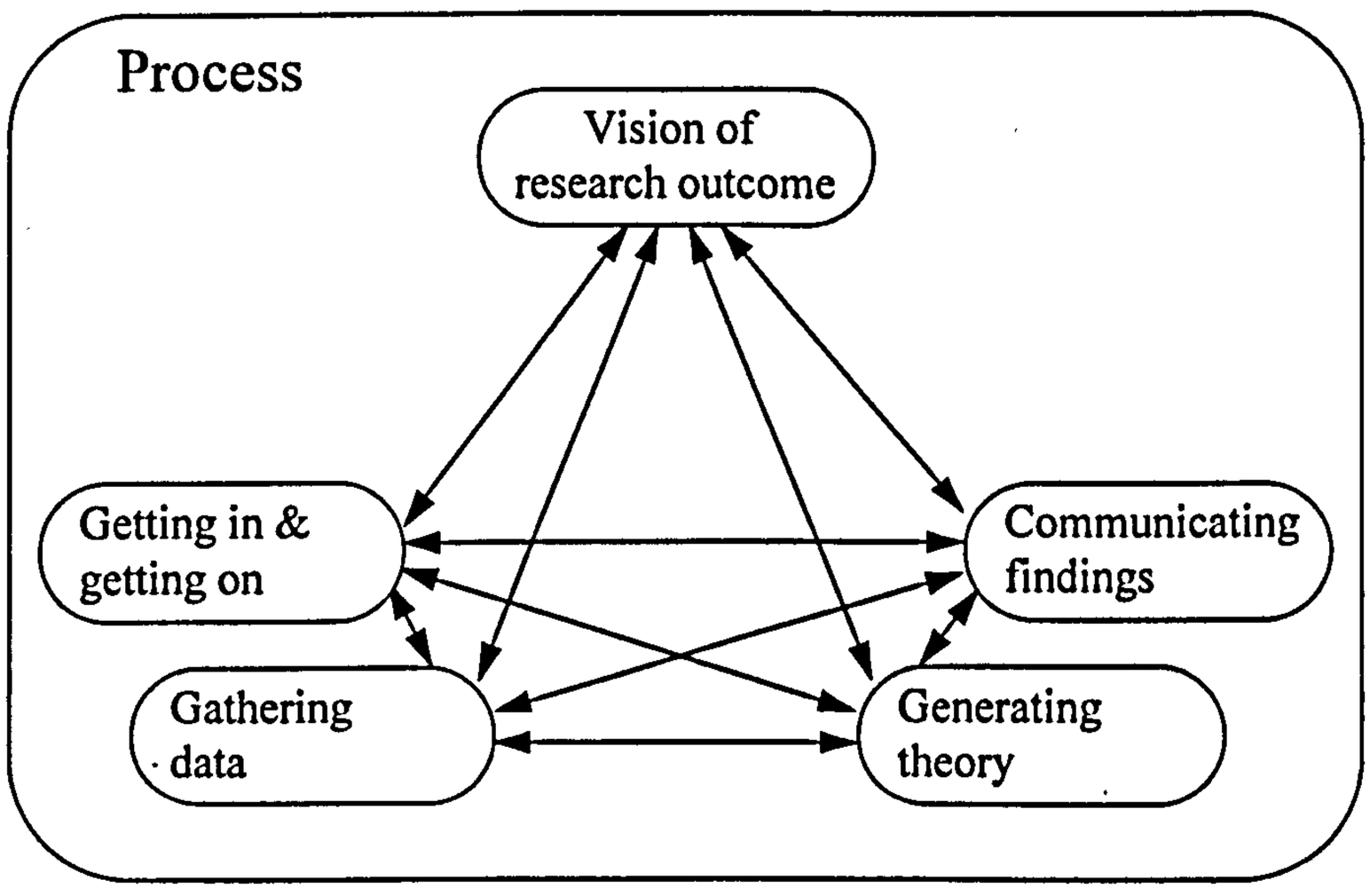


Figure 3-1 Interlinked research objectives

3.3.1 GETTING IN AND GETTING ON

3.3.1.1 IDENTIFYING APPROPRIATE RESEARCH SETTINGS

An obvious question raised by the objective of 'getting-in and getting-on' is how to identify an appropriate research setting to 'get in' to. This question can only be answered with reference to the aims of the research project, and therefore, for this study, careful consideration must be given to opportunities to investigate how organisational actors deal with complex issues. So far the broad setting of environmental management has been identified as a potentially rich source of insights and the previous chapter has highlighted a "sense of crisis" currently being experienced by organisational actors as they draw upon

existing structures of knowing and doing to deal with environmental issues that have no respect for those structures. This "sense of crisis" in dealing with environmental issues, and, more particularly, the questioning of assumptions and routine likely to accompany it, is presented as further justification for environmental management as a setting that would be likely to contribute revealing insights, similar to those gained in Zuboff's (1988) work on the introduction of new technologies.

In being more specific about the choice of a research setting, it is important to consider both the desirability and feasibility of possible settings. As this research is guided by a philosophical position which values insights arising from the researcher's interactions with the research setting, opportunities for rich interaction between researcher and those in the chosen setting, clearly constitute an important deciding factor. The study is being undertaken on a part-time basis by a researcher living in Manchester, England, so locational and temporal constraints will inevitably influence the choice of setting in this regard.

Opinion is divided between authors who have considered the extent to which a researcher must become 'immersed' in a research setting in order to gain a grounded appreciation of what is going on. Authors such as Pettigrew (1992) and Franz and Robey (1987) argue that in-depth understanding of the processes at work in an organisational setting, requires longitudinal research studies:

> "Longitudinal studies in which data are collected over multiple time periods or on a continuous basis are appropriate to this aim of grounding more complex process theories." (Franz and Robey, 1987, p. 209)

Other authors, such as Lemon (1991), have highlighted the value of actors' historical reconstructions of events as a way of interpreting critical changes over time. Following the latter argument exclusively may preclude options for the former; whereas some level of contact over time would allow both to be possibilities, but this brings its own challenges (see section 3.3.1.3). Nonetheless, the option for contact, albeit non-

continuous, over an extended period of time, is an important factor to consider when choosing a setting for part-time research in this tradition.

Another factor influencing the choice of setting relates to opportunities for reconstructing shared knowledge from texts and artefacts. High levels of documentation encountered in some organisational contexts - for example, those subject to detailed legislation - can provide a readily-accessible backdrop for interpreting the actions of individual actors (Gilbert, 1993) or for providing insight into "situated vocabularies" (Mills, 1940).

These attributes of an ideal research setting can now be summarised:

An ideal research setting for this project would be an organisation in the UK:
• engaged in environmental management activities
• currently experiencing a sense of crisis
• offering opportunities for rich interaction between researcher and organisational actors
• with the potential for contact over an extended period of time
• with readily-accessible texts and artefacts from which 'shared knowledge' can be gleaned

Table 3-4 Attributes of an 'ideal' research setting

3.3.1.2 NEGOTIATING ACCESS

Ethnography literature has urged researchers on the 'look-out' for settings that fulfil their ideal criteria, to be sensitive to potential barriers to access and to ways in which such barriers may be overcome (Hammersley and Atkinson, 1983). Reflecting on the difficulties she experienced in gaining access to settings for studying therapeutic and day-care services for pre-school children, Barbera-Stein (1979, p.15) writes:

> "The access negotiations can be construed as involving multiple views of what is profane and open to investigation vs. what is sacred or taboo and closed to investigation unless the appropriate respectful distance is assumed."

(reproduced in Hammersley and Atkinson, 1983, p. 55)

The notion of 'gatekeepers' - "actors with control over key resources and avenues of opportunity" (Atkinson, 1981 in Hammersley and Atkinson, 1983, p. 38) - is a recurrent theme in accounts of negotiating access to research settings, and a helpful concept when planning how to approach an organisation (Easterby-Smith et al., 1991). Researchers have also described how "sponsors" have helped them to establish the trust necessary to gain access to desired research settings, eg Whyte's "Doc" (1981) or Lemon's "Ben" (1991).

Establishing a working relationship with relevant 'gatekeepers' or a 'sponsor', is clearly a key activity in the process of 'getting-in and getting-on'. However, as Hornsby-Smith (1993) notes, in deciding a strategy for gaining access to a desired setting, a researcher must also contend with potential conflicts associated with the notion of 'informed consent':

> "... a responsibility on the sociologist to explain as fully as possible, and in terms meaningful to participants, what the research is about, who is undertaking it and financing it, why it is being undertaken and how it is to be disseminated."

Informed consent is regarded:

> "... not as a once-and-for-all prior event, but as a process, subject to negotiation over time ..." [obtained] "... directly from research participants ... while at the same time taking account of the gatekeepers' interest" (British Sociological Association, 1991).

As this research seeks to gain access to organisations that are experiencing a sense of crisis in their attempts to deal with environmental issues, 'informed consent' and 'establishing a working relationship with gatekeepers that is based on trust' will be vital to the process of 'getting-in and getting-on' as such organisations may well be wary of being exposed to interest from outside, eg from environmental campaigners. Access

negotiations will therefore form an important part of the fieldwork accounts that appear later.

3.3.1.3 ESTABLISHING AND MAINTAINING AN APPROPRIATE ROLE FOR THE RESEARCHER

The objective of 'getting-in and getting-on' invites researchers to consider the role they will emphasise during their investigations, as it is likely that actors will fit them into a behavioural model in order to know how to interact with them (Hammersley and Atkinson, 1983, pp. 73-75). Suggestions vary on suitable roles to adopt. Junker (1960), for instance, presents a continuum between researcher as observer and as participant, with intermediate stages of observer-participant and participant-observer. Under the view of research that guides this study, the model of a researcher as a neutral, detached observer would undervalue insights arising from the researcher's reflection upon her/his interactions with the setting being studying. Indeed, in accordance with this reflexive view of research, many ethnographers argue for a marginal role that maintains sufficient closeness for understanding, but sufficient distance for reflection; in Freilich's (1970) words, the researcher is a "marginal native". Lofland (1971) describes a similar role, that of the researcher as an "acceptable incompetent". She highlights "creative insight" that can arise from adopting a marginal position but notes the fieldwork stress that can arise from being simultaneously insider and outsider. Hammersely and Atkinson (1983) concur, describing a "continual sense of insecurity" that a marginal role can engender, but they suggest that:

> "There must always remain some part held back, some social and intellectual 'distance'. For it is in the 'space' created by this distance that the analytic work of the ethnographer gets done." (p. 102).

The desire to adopt and maintain a convincing role has led some ethnographers to engage in sophisticated attempts to manage "personal front" (Goffman, 1955) and dress code (Parker, 1974). Hammersley and Atkinson (1983) suggest that by varying the role adopted within a particular setting, access can be gained to different kinds of data and

"some sense of the various kinds of bias characteristics [maintained by informants]" may emerge.

It is clear from these ethnographic accounts that establishing and maintaining a suitable marginal role is an important part of the process of 'getting-in and getting-on' and, also, an important reminder that the four key objectives that structure this research are very much interlinked. Reflection on how a role for the researcher was chosen and maintained will therefore be included in fieldwork accounts that appear later.

3.3.2 GATHERING DATA

Section 3.2 described how actors, and the artefacts they interact with in a particular setting, offer a rich source of data to a reflexive participant-researcher. However, a researcher faces a complex choice regarding who or what to interact with, how to interact, and when to interact, if useful and revealing insights are to be gathered. This section will consider the challenge of gathering data in terms of planning research encounters (with both actors and artefacts) and employing appropriate research instruments.

3.3.2.1 SELECTING RESEARCH ENCOUNTERS

The dilemma of deciding a strategy for gathering data is featured in most texts on social research (see, for instance, Easterby-Smith et al., 1991; or Gilbert, 1993). Such texts tend to classify data gathering approaches in terms of the 'sampling strategy' they employ: typically whether they adopt a probability-based, or non-probability-based, approach to selecting research encounters (Gilbert, 1993). Non-probability-based approaches tend to reject statistical measures of the representativeness of a particular choice of planned research encounters, in favour of more qualitative assessment of the meaning of the insights gathered and of the transferability of the insights beyond the setting in which they were originally gathered. Studies that recognise dynamic interplay between actors and the world they inhabit, inevitably question the notion of making a static, quantitative assessment of a study population that they believe to be continually changing; as Susman and Evered (1978) note:

> "Where Heraclitus observed that 'you cannot step into the same river twice', his modern counterpart could comment that you cannot step into the same social system twice." (p. 596)

Grounded Theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990) provides a classic example of a non-probability-based data gathering approach; it develops the notion of 'theoretical sampling' in which research encounters are selected with a view to best advancing theory, and data gathering is stopped when 'theoretical saturation' is achieved (Glaser and Strauss, 1967). Other non-probability-based approaches include 'snowballing': following a network of actors who identify others who share a common bond - eg Plant's drug taking network (1975). These approaches provide opportunities for exploiting a researcher's emerging appreciation of the situation s/he is studying, but picture the design of a strategy for gathering data as a process, rather than a one-off event. The image of an emergent data gathering strategy accords with the philosophy of this work, particularly its recognition that planned action can lead to unintended consequences. This work is not alone in adopting an emergent perspective; Schatzman and Strauss (1973) present a similar model of field research in which:

> "Method is seen by the field researcher as emerging from operations - from strategic decisions, instrumental actions, and analytic processes - which go on throughout the entire research enterprise." (p. 7)

In adopting an emergent approach to data gathering, this does not mean that research encounters will be entered into without thought or without planning. Reflexive participant-researchers continually face complex decisions regarding their engagement in research encounters; they must be able to plan useful encounters and to take advantage of unanticipated opportunities as they present themselves. In deciding a course of action, such a researcher must keep in mind the overall aim of the research, and s/he must be sensitive to the audience for her/his actions. Her/his emerging vision of the research endeavour thus acts as a star by which to navigate; as Strauss and Corbin (1990) note:

> "The original research question is a directive that leads the researcher immediately to examine a specific performance, the site where events are occurring, documents, people acting, or informants to interview." (p. 39)

This study, therefore, will adopt an emergent data gathering strategy in which the emphasis will be on me to plan and to take advantage of serendipitous research encounters in an on-going process that is guided by my emerging vision of the research outcome. Critical reflection on my decisions to engage in, or to ignore, potential research encounters will play an important part in describing the fieldwork in later chapters.

3.3.2.2 EMPLOYING APPROPRIATE RESEARCH INSTRUMENTS

There is no shortage of instruments or techniques from which a researcher may choose when attempting to gather data. Research instruments vary widely according to their suitability for individual or group situations; the extent to which a researcher places limits on the potential range of responses that might be received from informants; and the extent to which the researcher interacts with informants when the instrument is used. There is much debate in the literature on the pros and cons of the various instruments and techniques, but there is some agreement that research instruments should be chosen that are appropriate for the philosophy, aims and setting of the particular research study. Furthermore, the researcher should be comfortable in using the instruments/techniques that have been chosen (Easterby-Smith et al., 1991; Gilbert, 1993; Morgan, 1983).

Critical reflection on decisions to employ or design appropriate research instruments and techniques is an important part of the fieldwork process, but full consideration of these decisions will be postponed to later chapters. In the 'adaptive' research approach adopted for this study, decisions to employ different research instruments depend upon the researcher's reading of a continually changing research setting; in-depth reflection on the choice of research instruments and techniques will therefore appear in the chapters that present the fieldwork.

3.3.3 GENERATING THEORY

3.3.3.1 DEVELOPING THEORETICAL SENSITIVITY

When making sense of gathered data, many authors acknowledge the importance of being sensitive to concepts, models and theories that may contribute to the sense-making process (Checkland, 1981; Glaser and Strauss, 1967). However, as Strauss and Corbin (1990) highlight, the aim is to use this "theoretical sensitivity ... to aid rather than ... block theory development" (p. 41). They identify potential sources of a researcher's 'theoretical sensitivity' as literature, professional experience and personal experience; and stress the importance of using this knowledge imaginatively whilst remaining faithful to the phenomenon that is being studied. Rather than polarising the complex relationship between theory and data into a dialectic between deduction (starting with theory and testing it by gathering data) and induction (starting with data and developing theory), Grounded Theory's emphasis on 'theoretical sensitivity' recognises a mutually-informing relationship between theory and data:

> "There is **constant interplay between proposing and checking.** This back and forth movement is what makes our theory grounded !"
> (Strauss and Corbin, 1990, p. 111, emphasis in original)

By deliberately seeking to heighten awareness of potentially enlightening concepts and theories through exposure to appropriate literatures, a researcher runs a risk of simply reproducing received 'ways of seeing' when interpreting data that has been gathered. The 'trick' is thus to be informed but not constrained by the mental models that are brought to the data. In their call to "balance science with creativity", Strauss and Corbin (1990) urge researchers to maintain an attitude of scepticism, to continually move between data collection and analysis, and to periodically step back and ask:

> "What is going on here ? Does what I think I see fit the reality of the data ?" (p. 44).

This notion of 'creative science' will be developed further in the next section (and further still in Chapter 7), but the key point here is that attempts to develop theoretical sensitivity

deserve to be reflected upon critically throughout the research process. To illustrate this point, the literature survey in Chapter 2 raised the need for a conceptual framework to link the content, context and processes of environmental management; the identification of such a framework will therefore feature in the accounts of the fieldwork in which it is grounded. Other particularly enlightening concepts and theories will also be highlighted in accounts of the fieldwork that they inform.

3.3.3.2 ANALYSING DATA

The previous section has highlighted how the process of theory generation requires the researcher to address the complex relationship between emerging theories and gathered data. Kuhn (1970) describes the process, thus:

> "Discovery commences with the awareness of anomaly, i.e, with the recognition that nature has somehow violated the paradigm-induced expectations that govern normal science." (pp. 52-53)

Here, the process of theory generation is portrayed as being driven by lack of congruence between data gathered and models that purport to account for those data. However, analysis of data collected may also reveal patterns or "movements" within the data that "complicate the picture" and beg explanation (Strauss and Corbin, 1990). Similarities and differences between data can provide scope for developing typologies that prove useful for accounting for the data or behaviour that have been noted (Lofland, 1971). Rather than re-opening debate regarding the causal agency of discovery (in terms of whether impetus derives from theory or from data), the above contributions can be more helpfully reconceptualised using the image of discovery as 'creative problem-analysis'. This image of discovery has led to renewed interest in forms of reasoning, other than induction and deduction, for generating new scientific knowledge: in particular, retroduction and abduction (Blaikie, 1993). These strategies emphasise "disciplined scientific imagination" as a way of dealing with mutually-informing relationships between whole and parts.

The reflexive-participative research approach adopted for this study recognises the hermeneutic processes involved in interpreting data and, importantly, values the understanding that actors other than the researcher can contribute. Analysis from perspectives other than the researcher's own, can be extremely valuable and may lead to novel insights; as Strauss and Corbin (1990) observe:

> "Each of us brings to the analysis of our data our biases, assumptions, patterns of thinking, and knowledge gained from experience and reading. These can block our seeing what is significant in the data, or prevent us from moving from description to theoretical levels of analysis." (p. 95)

A wide range of techniques to facilitate the process of data analysis have been documented; some, such as content analysis (Easterby-Smith et al., 1991), concentrate on the frequency with which particular data items occur; others, such as Grounded Theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990) seek to provide the researcher with rigorous and creative techniques for developing theory based on the meaning of data. However, this is not to say that analysis can either focus on the frequency or the meaning of data exclusively; consideration of each can inform analysis of the other (Lemon, 1991). Markus and Robey (1988) move this debate forward by shifting emphasis away from a quantitative versus qualitative dichotomy, to consideration of the logical structure of the theory that shapes, and is shaped by, the process of data analysis. Following Mohr (1982), they draw a distinction between attempts to develop process and variance theories, noting how:

> "[in process theories] outcomes are (partially) predictable from a *knowledge of process*, not from the level of predictor variables" (Markus and Robey, 1988, p. 590)

The aim of this research study is to develop a constituitive process theory of actors' attempts to deal with environmental issues in an organisational setting; therefore the purpose of data analysis will be to understand the dynamics that shape actors' perceptions and actions. My attempts to interpret these dynamics will inevitably be shaped by the knowledge I bring to the sense-making process; attempts must therefore be made to inject

creativity and imagination into this process if I am to avoid imposing previous knowledge onto the data gathered (Strauss and Corbin, 1990). Researchers like me, must consider involving other actors' in the sense-making process, as their other 'ways of seeing' can contribute to the theory development process. In short, creative, participative analysis is required. The detail of the methods used to implement this goal will depend on the setting in which they are required; data analysis methods will, therefore, be documented in full as part of the description of the fieldwork undertaken.

3.3.3.3 VALIDATING EMERGING CONCEPTS AND THEORIES

Approaches to assessing the validity of constructs developed through the research process tend to include some consideration of the rigour with which research instruments were employed; some assessment of whether the constructs appear to constitute reasonable findings for the situation investigated; and some consideration of the usefulness of the constructs. Under the worldview that guides this research, it is meaningless to say a particular construct is true without specifying for whom and under what circumstances. By applying the principle of a 'sense of audience', it becomes more helpful to talk about how useful the constructs are and to whom - a point echoed in Downs and Stea's (1977) consideration of the accuracy of an individual's cognitive map:

> "... we can see that the obvious question concerning the accuracy of cognitive maps is misleading. It is only when accuracy is taken to mean useful that we can answer the question." (p. 102)

Walsham (1993) makes a similar point:

> "... the testing of the value of these insights to others can be carried out by exposing the approach through verbal and written discourse to enable broader judgements of value to be made. Theory can be compared, evaluated and improved by this form of public testing; the result is not the generation of 'best' theory, but the creation of intersubjectively tested theoretical approaches, considered of a value to a broader group than a single individual." (p. 6)

And Beer's (1985) comments on the validity of his Viable Systems Model also concur:

> "There is no 'correct' interpretation of the VSM. We have spoken instead of more or less useful interpretations." (p. 124)

In this study, assessing construct validity is regarded as a process, not a one-off event that takes place at the end of the research project. Strauss and Corbin (1990) present a similar view of an on-going process for developing valid theory:

> "**Unless we validate possible meanings** during interaction with the speakers, or train ourselves to ask what meanings the various analytically salient terms have for our respondents, we limit the potential development of our theory."
> (pp. 83-84, emphasis in original)

It is helpful to view the process of assessing validity of concept and theories developed in the study, as a conversation about the usefulness of, and limitations upon, the insights researchers have gathered. Depending on the sensitivity of their work, researchers may engage multiple audiences in conversation regarding the usefulness of the concepts and theories developed therein. Those audiences could include actors in the setting under investigation, existing literatures, colleagues and peers (Morgan, 1983). The strategies thus chosen for assessing the validity of research are important and context dependent; they will therefore feature in the accounts of fieldwork that appear in later chapters.

3.3.4 COMMUNICATING FINDINGS

3.3.4.1 IDENTIFYING AUDIENCES

The previous section portrayed assessing the validity of concepts and theories as a conversation, highlighting that (in this view of research) communicating findings is an on-going process in which careful consideration of potential audiences is a critical activity. In demonstration of this point, Schatzman and Strauss (1973) describe how

novel insights can arise when researchers consider their findings in the light of potential audiences, noting that:

> "... the number and range of audience types will differ for each researcher; his options to avoid, lightly entertain, or seriously meet 'head on' these different audiences will vary, as will the risks entailed for avoiding or making contact." (p. 130)

Researchers' on-going consideration of potential audiences for their findings, and their decisions about which audience types to engage, when, and to what extent, constitute important events in the research process. This category is thus included as an important reminder of the critical contribution 'a sense of audience' makes to the research process, as well as forming a vital part of the template for contemplating and describing fieldwork.

3.3.4.2 DESIGNING EFFECTIVE COMMUNICATION

A researcher seeking to share the understanding s/he has gained from her/his research efforts can draw on a range of possible communication channels and strategies. These channels and strategies vary in the extent to which they reach a range of individuals and in the extent to which they permit a two-way sharing of ideas. For example, a newspaper article has the potential to communicate ideas to a large number of individuals, but it offers limited scope for feedback and exchange of understanding between writer and readers. A researcher's consideration of appropriate communication channels for her/his findings can be a valuable part of the learning process (Schatzman and Strauss, 1973), as can her/his consideration of appropriate structures and language formats for sharing her/his knowledge (Giddens, 1984). Goodey (1974) argues that it is incumbent upon researchers to consider how to communicate their findings so that they are readily accessible to those who need to make use of them:

> "Implicit in the philosophy of most students involved in perception research is the belief that by discovering individual and group perceptions, processing them, *and* communicating results, some improvement in man's (and not just the researcher's) lot will be achieved. Rather late in the day we have woken up to the fact that aside from

> theoretical and methodological development, there must be a parallel improvement in the researcher's techniques of communication and understanding of the policy planning and decision-making systems." (p. 36, italics in original)

Consideration of ways to communicate research insights effectively clearly forms an important part of the research process, although it often suffers from inadequate attention (Giddens, 1984; Goodey, 1974). By including "designing effective communication" in the framework developed for contemplating and describing fieldwork, it is hoped that in following it, a researcher will be encouraged to reflect explicitly on the attractiveness and limitations of possible communication media and strategies. Such reflection is not a one-off event; it is an on-going process and again my efforts to respond to the objective will be described more fully in the fieldwork chapters that follow.

3.4 SUMMARY

This chapter has considered perspectives on conducting social research and presented a case for reflexive participative research in the 'constituitive process' tradition. In accordance with this perspective a framework has been developed to guide the study's 'adaptive' research process. This framework is based on the principle of operationalising an emerging vision of the research outcome in terms of four interlinked objectives. These objectives have been broken down into sub-categories to provide a template for contemplating and describing fieldwork activities:

Getting In and Getting On

- Identifying Appropriate Research Settings
- Negotiating Access
- Establishing and Maintaining an Appropriate Role for the Researcher

Gathering Data

- Selecting Research Encounters
- Employing Appropriate Research Instruments

Generating Theory • Developing Theoretical Sensitivity • Analysing Data • Validating Emerging Concepts and Theories Communicating Findings • Identifying Audiences • Designing Effective Communication

Table 3-5 A framework for adaptive research

As this framework informed the study at all stages, it will be used to structure the account of the fieldwork that follows.

4. EXPLORATORY STUDY: WASTECO

This chapter will present justification for an exploratory study as a means of developing familiarity with pertinent issues and with research methods appropriate to their investigation. It will also argue for the particular value of an exploratory study for this research project.

Evaluation criteria, developed in Chapter 3, will then be used to explain the decision to base this exploratory study within a network of actors engaged in gathering and interpreting data about the environmental effects of a number of landfill sites in the UK. The exploratory study will then be presented using the framework developed in Chapter 3; issues raised and emergent research themes will be compared against those highlighted in the literature survey presented in Chapter 2.

The chapter will conclude by reflecting upon how the research agenda has developed as a result of the exploratory study.

4.1 THE VALUE OF PILOTING RESEARCH METHODS

Before embarking on a major piece of research, it is common practice to engage in some kind of pilot research activity. Pilot interviews have been identified as particularly useful for gathering sensitising concepts and developing familiarity with the field before entering (Fielding, 1993a; Lemon, 1991). "Piloting" is also a popular mechanism for refining research instruments prior to using them with a large number of informants (Arber, 1993; Lemon, 1991). Reflecting upon her survey of housing tenants, Sara Arber describes how:

"The interview schedule was then piloted on tenants who were not in the sample. These pilot interviews provided invaluable insights for altering question wording, adding questions about issues which were of particular concern to informants but which we had not thought of, omitting or changing questions, and altering the order of questions to provide a more logical flow." (1993, p. 40).

Here, opportunities for heightening a researcher's sense of audience before embarking on a more major study are apparent. The quote also draws attention to decisions that must be made regarding membership of the group selected for the pilot study. These concern, in particular, how the pilot group relates to the group that will constitute the main focus for the research. A pilot group that does not contain individuals selected for the main study is often regarded as 'safe' for experimenting with research techniques and instruments; in theory the main study should be able to learn from, rather than be forced to recover from, mistakes made in the pilot. However, separation between experimental and focal research settings may not be as easy to achieve in practice. If the pilot study group is chosen on the basis that the individuals within it are experiencing a similar situation to those in the main study, then it is quite possible that individuals within the two groups will interact (Easterby-Smith et al., 1991). Under such circumstances a researcher may have to respond to (mis)interpretations that informants in the focal group have drawn from conversations with informants involved in the pilot. There is thus an inevitable compromise to be made between developing a meaningful and comprehensive sense of audience for the main study, and achieving freedom to engage in experimentation without affecting the main study.

4.2 AN EXPLORATORY STUDY: MORE THAN PILOTING RESEARCH METHODS

Given the valuable experience that can be gained from pilot research activities, an initial study was considered prudent. However, the research strategy developed in Chapter 3 not only emphasises the skills and techniques of the researcher; in the tradition of the constant comparative method, it also argues for the importance of developing sensitivity to key research themes by setting up a mutually-informing dialogue between the literature and the field (Strauss and Corbin, 1990). In order to reflect these dual objectives, the initial study is described as an exploratory study, rather than a pilot.

Being mindful of the trade-offs identified in the previous section, a research setting had to be found that enabled suitable experimentation for developing research technique, whilst simultaneously providing rich opportunities to 'tune in' to complex environmental issues

as they were being experienced by organisational actors. In so doing, an appropriate setting would enable the research agenda that emerged from the literature survey (**Table 2-1**, p. 46), to be grounded in the experience of environmental management practitioners.

Table 3-4 (p. 61) specifies attributes of an ideal research setting in which to develop a contribution to knowledge on organisational actors' dealings with environmental issues. Along with opportunities for experimentation, these attributes were used to inform selection of an appropriate setting for the exploratory study. The sections that follow describe how that study took shape.

4.3 VISION OF THE RESEARCH PROBLEM

The research agenda that emerged from the literature review conducted in Chapter 2 (and summarised on page 46), identified "integrating environmental data to produce meaningful insights" as a research problem likely to contribute towards thesis development. Given the complex and emergent nature of the issues being investigated, it is clear that focusing upon an information problem is not the only conceptualisation of a research problem that could have been adopted for the exploratory study. However, it was chosen as it appeared from the literature to offer a fruitful avenue for enquiry. Furthermore, the problem was located in a context where 'theoretical sensitivity' was already well-developed because of my experience of, and full-time employment in, the field of Information Systems (IS). Aside from the benefits that Strauss and Corbin (1990) see in bringing such theoretical sensitivity to the research setting, I hoped that the choice of a familiar problem would enable greater emphasis to be placed on the development of research skills, particularly those associated with exercising disciplined scientific imagination (section 3.3.3.2).

In adopting this vision of an environmental information problem, the study was immediately directed towards exploring ways to facilitate a move away from the "lots of data but little information" scenario highlighted in section 2.3.4. In order to achieve this, actors' perceptions of the process of collecting and interpreting environmental data needed to be elicited, and understanding of how this process was being shaped by (and,

indeed, was shaping) the organisation setting in which it was situated, became a priority (Orlikowski and Robey, 1991; Walsham and Han, 1991; Zuboff, 1988). The sections that follow describe how this vision of an environmental information problem was operationalised in the exploratory study.

4.4 GETTING IN AND GETTING ON

Once the need for an exploratory study had been established, it was important to be on the 'look out' for suitable settings using the evaluation criteria in **Table 3-4**. At this time a favourable relationship had been established with the Corporate Environmental Affairs Manager at a major UK utility. This relationship centred around a shared interest in the role of information technology in environmental management and had already resulted in a joint publication (Nixon et al., 1994). On the strength of surface impressions, the utility appeared to fulfil the criteria for a suitable setting and the Corporate Environmental Affairs Manager had strong potential as a 'gatekeeper' to relevant areas of the organisation. He also shared an interest in environmental information problems and how they might be explored. However, the utility was not chosen for the exploratory study for two main reasons. First, the scale of the utility's operations - over 2000 sites in the UK - suggested that it might be more appropriate for a central study. More importantly, the Corporate Environmental Affairs Manager hinted that imminent "down-sizing" planned for the utility would leave employees with little time, or inclination, to take time away from their duties to talk to a researcher. For these reasons the utility was rejected as a setting, although the Corporate Environmental Affairs Manager provided a useful 'sounding board' for ideas throughout the research process (see Chapter 6).

At about the same time as the utility was rejected, on-going odour-monitoring work being conducted by Cranfield's International Ecotechnology Research Centre (IERC) for a locally-based waste management company, WasteCo (a pseudonym), raised the question of how environmental data might be integrated to gain better understanding of the processes at work. The research-coordinator for the WasteCo project had been made aware of this project's plans for an exploratory study and he suggested that an environmental information study could be mutually beneficial. Although I had not

initiated contact, a key feature of the research strategy developed to guide this study is a willingness to exploit serendipity if it should present itself. A detailed consideration of the suitability of WasteCo as an exploratory study was therefore undertaken.

4.4.1 IDENTIFYING APPROPRIATE RESEARCH SETTINGS

This section considers the suitability of the setting offered by WasteCo's waste management operations using the criteria developed earlier (**Table 3-4**, p. 61):

4.4.1.1 AN ORGANISATION IN THE UK ENGAGED IN ENVIRONMENTAL MANAGEMENT ACTIVITIES

The business of waste management has the potential to impact upon all three recognised environmental sinks: air, water and land. Waste incineration and processes of waste decomposition can produce emissions to air; leachate from landfill operations can enter water courses; and land is obviously used for the disposal of waste as landfill (Greaves, 1994). In addition, waste management operators are required to be sensitive to the uneven distribution of benefits and disbenefits from the services they provide. Society as a whole benefits from waste management services whereas those neighbouring a waste management site experience the majority of disbenefits, such as reduced visual amenity, increased heavy vehicle movements and odour nuisance (Lemon et al., 1994). A commitment to respond to the resulting environmental management responsibilities is the key message in WasteCo's Corporate Environmental Policy document:

> *"[WasteCo] is committed to implementing a Corporate Environmental Policy throughout its business of safe handling and disposal of society's waste. This business is conducted in a responsible manner which minimises the adverse effects upon the environment and public health.*
> *This policy has been approved by the Directors of the Group and endorsed by the independent Environmental Advisory Board. All employees are required to support the Policy, which is a cornerstone of Group strategy"* (p. 2)

Organisations in the business of waste management are also subject to a high level of regulation enforcing responsibilities for public and environmental safety (see section 4.4.1.5 for more details). Therefore, on the strength of the information available, WasteCo's waste management operations were deemed to fulfil the first of the five criteria for a suitable research setting.

4.4.1.2 ... CURRENTLY EXPERIENCING A SENSE OF CRISIS

The second criterion was more difficult to assess from a distance. Corporate publications were examined, articles on the waste industry were reviewed and researchers involved in the IERC odour-monitoring project were interviewed.

The first indication of a potential crisis came from the presence *of "discussion documents*" concerning the "*Best Practicable Environmental Option for the disposal of hazardous wastes*". These documents, and also a number of articles in the trade press featuring contributions from WasteCo staff (eg. Philpott, 1995, and Newman's quotes in Rose, 1995), demonstrated the company's involvement in on-going debates about what constitutes best environmental practice for the waste industry. Analysis of trade literature at the time showed the debate to concern future prescriptions for waste management practice and highlighted a significant difference of opinion between the UK and continental Europe over the appropriateness of co-disposal of selected industrial wastes with municipal wastes (DoE, 1993a; ENDS, 1994; EB, 1994). One industry commentator suggested that recent technical guidance provided by the UK Government in the form of Waste Management Papers (WMPs) had actually contributed to the climate of uncertainty for waste management operators:

> "One of the most remarkable ... features of WMPs 26B and 26F is the extent to which they depart from the Government's normal approach to technical guidance by advocating the use of techniques which, by its own admission, are unproven in practice. Operators are simply encouraged to experiment with them - and, by implication, bear any environmental liabilities which they may create."
> (ENDS 1995b , p. 32).

WasteCo's "discussion documents" were therefore interpreted as attempts to legitimate their activities (Giddens, 1984) during a period where consensus was lacking on what constituted best environmental practice for the industry.

In addition to engaging in debate about what constitutes desirable norms for the waste management industry, WasteCo had recently undergone a period of significant restructuring. Researchers involved in the odour-monitoring project described how resource-allocation structures had been changed with a view to "flattening" the organisation. These changes had resulted in a number of redundancies, although throughout this period support had been maintained for the odour-monitoring work. Odour-monitoring researchers had interpreted this support as a symbol of WasteCo's commitment to environmental management, although they described the organisational climate at the company as "*less than settled*".

Further evidence of uncertainty was revealed in the analysis of relevant trade press. Industry commentators indicated that the legislative framework shaping the waste industry was about to undergo major change with the introduction of a tax on wastes disposed of to landfill (DoE, 1995; EB, 1995a; ENDS, 1995a; Rose, 1995), and an integration of previously separate regulatory powers under the auspices of a new Environment Agency (EB, 1995b). The UK Government had also recently made several revisions to its technical guidance papers governing waste management practice (DoE, 1993b, 1994). In short, analysis from a distance indicated that shifts in the legislative and regulatory framework surrounding the UK waste management industry had placed environmental performance on the corporate agenda but had also served to create significant uncertainty for waste management operators.

On the basis of evidence about uncertainties over the regulatory framework shaping environmental practice, new resource-allocation structures resulting from organisational restructuring, and the struggle to establish industry norms for waste management, WasteCo was deemed to meet the 'sense of crisis' criterion.

4.4.1.3 ... OFFERING OPPORTUNITIES FOR RICH INTERACTION BETWEEN RESEARCHER AND ORGANISATIONAL ACTORS

The existing relationship between WasteCo and Cranfield's IERC (in which this research study is also located) had involved contact with staff at all levels within WasteCo. The research coordinator for the odour-monitoring project described how staff were "*usually busy but willing to participate in research*". On the basis of this evidence the setting appeared likely to meet the third criterion, although this needed to be explored in greater depth during access negotiations (see 4.4.2).

4.4.1.4 ... WITH THE POTENTIAL FOR CONTACT OVER AN EXTENDED PERIOD OF TIME

Significant elements of WasteCo's waste management operations - its head office and two of its largest landfill sites - are easily accessible from Cranfield University. Also, the contract for the odour-monitoring work had recently been renewed, ensuring on-going contact between IERC and WasteCo for the coming year. The setting therefore appeared to meet the fourth criteria, although more detailed information on the potential for extended contact would, again, need to be gathered during the process of negotiating access (see 4.4.2).

4.4.1.5 ... WITH READILY ACCESSIBLE TEXTS AND ARTEFACTS FROM WHICH 'SHARED KNOWLEDGE' CAN BE GLEANED

The highly-regulated nature of the waste management industry meant that a wealth of texts was available describing the duties of waste management operators (eg DoE, 1993b, 1994; HMSO, 1994). Corporate publications, such as Annual Reports, also provided a rich source of material for interpreting the organisation's strategy and formal structure. Data collected for the odour-monitoring project were also available, providing useful background on WasteCo's environmental management efforts. Also, an embryonic computer system for managing environmental data had been mentioned when the possibility of a study was first raised by the odour monitoring research coordinator. It

was therefore apparent that a range of accessible texts and artefacts was available for this setting, fulfilling the fifth criterion for suitability.

4.4.1.6 SUITABILITY FOR AN EXPLORATORY STUDY: OPPORTUNITIES FOR EXPERIMENTATION

Earlier in this chapter (in section 4.1), the opportunity to develop research skills through experimentation was identified as an additional criterion for selecting a suitable setting for this exploratory study. In deciding the suitability of WasteCo in this regard, the existing relationship between the company and IERC was an important factor to assess. Depending on how the relationship was interpreted, the suitability of the setting could either fail or pass the criterion. WasteCo was an important research partner for IERC, therefore experimentation that might sour the relationship was undesirable - a factor which might be considered constraining. However, the existing research relationship was an indication of WasteCo's willingness to support Cranfield research, something the company had done by providing informed feedback in the past - a factor which might be looked upon as extremely positive.

As this study aims to be guided by the central principle of a sense of audience (an awareness of how one's actions are felt by others), the decision was taken that WasteCo would constitute a suitable setting. Being aware of negative consequences resulting from attempts to develop research technique is an in-built priority for the study, therefore (in theory at least) the risk of souring the IERC relationship would be minimised. Furthermore, an important objective for the exploratory study was to develop research skills, therefore the opportunity to benefit from informed feedback from WasteCo staff had a major influence on establishing the setting as appropriate.

4.4.2 NEGOTIATING ACCESS

Initial contact with WasteCo was orchestrated through the coordinator for the IERC odour-monitoring research project acting as a 'sponsor'. In May 1995, the odour-monitoring research coordinator introduced to Professor Green, Principal Environmental

Scientist at WasteCo, a document I had written which outlined the rationale and scope for a short study focusing on WasteCo's environmental monitoring activities (see appendix 13.1, p. 373). The two-page document, entitled *"Lots of data but little information: learning to collect and organise environmental data with a sense of audience"*, had been written with a view to setting the tone for further contact. In recognition of anticipated concerns that WasteCo employees might have about taking time away from their duties to support the research, the document was deliberately concise and focused upon an issue (making sense of environmental data) which was thought to be particularly relevant. In order to alleviate potential concerns about letting an outsider into the company, both the language used for the document, and the details I supplied about myself, emphasised familiarity with business practice and suggested that potentially useful expertise (in the area of information technology) would be brought to the company.

The outcome of the meeting was an invitation to contact Professor Green directly to discuss specific arrangements for the exploratory study; a face-to-face meeting was thus arranged for the end of May.

The first meeting with Professor Green took place at WasteCo's headquarters, a large converted hospital on the outskirts of a picturesque village. Following MacDonald and Tipton's (1993) invitation for researchers to learn from the wide range of artefacts with which they come into contact, and particularly MacDonald's reflections on interpreting the headquarters of organisations (ibid, pp. 201-216), first impressions of the layout of WasteCo's headquarters were noted. Observations made on the way to Professor Green's office indicated that *several conversion projects had taken place at different times resulting in a multi-level arrangement of relatively large, usually shared, rooms accessible from narrow corridors. Old and new parts of the building seemed to blend with reasonable harmony, giving the overall impression of an organisation that had grown over time and now appeared to be characterised by close-knit team-working.* Like Law's first impressions of the Laboratory (1994), these initial impressions fuelled subsequent investigation (see section 4.5.2).

Contact with Professor Green, and observation of interactions between him and other members of staff, suggested that his position and expertise were well-respected within the organisation, marking him out immediately as an important 'gatekeeper' (Fielding 1993b; Hammersley and Atkinson 1983). This initial impression was reinforced in subsequent access negotiations which focused upon establishing agreement in three key areas:

- a mutually-beneficial focus;
- ground-rules for interaction; and
- timing of the study.

Professor Green explained that as Principal Environmental Scientist he had overall responsibility for the accuracy and interpretation of environmental data collected by the environmental-monitoring team. He agreed that the study outlined in the two-page proposal could be beneficial to the environmental-monitoring team and he identified two individuals who could provide useful starting points for a study undertaken in August. Throughout the meeting he emphasised that his main concern was that candid in-house analyses of environmental data should not be released without prior consent. He described how "*data could easily be taken out of context*" by "*eco-terrorists and the like*" who would have no hesitation in encouraging sensational local newspaper headlines portraying landfill sites as "*toxic hell holes*". He was clearly guided by a sense of audience.

In accordance with the importance placed by Professor Green on rules of engagement for the study, detailed minutes of the meeting were circulated so that written ground-rules could be confirmed before the study commenced.

Whilst this initial meeting marked an important milestone in the process of negotiating access for the study, obtaining informed consent for research is regarded as more than just a one-off event (Hornsby-Smith, 1993). During the exploratory study a brief explanation of the purpose of the research and of plans for communicating the findings was provided at the start of each first-contact meeting with members of WasteCo. In several cases informants took it upon themselves to arrange meetings with colleagues they thought would be useful; fortunately, I was present while the meetings were arranged (usually by

telephone) and therefore in a position to correct any inaccuracies in the informants' explanations of the research study.

Experience of arranging meetings with WasteCo employees concurred with that of Lemon (1991) regarding the importance of language; a "chat" appeared to be a lot easier to arrange than an "interview" ! Surprisingly the 'IT expert' role that was emphasised (see next section) seemed to have a very positive effect on securing some meetings. A number of employees had taken it upon themselves to develop prototype IT systems to help them in their duties and their willingness to talk at length about their work was interpreted as an attempt to gain reassurance and legitimation for their efforts from an 'IT expert' who was prepared to listen.

On reflection the overall process of negotiating access went smoothly, but actions taken were not without unintended and unanticipated consequences. Despite determined attempts to arrange meetings, access to some employees was not secured (see section 4.5.1). Indeed, at one point, numerous attempts to secure an interview with the IT manager were mis-interpreted as an application for a job ! Fortunately, once the confusion created by the word "interview" had been identified, it was quickly resolved with the help of Professor Green and a faxed message explaining the rationale for making contact. The exploratory study provided valuable lessons on the importance of establishing a working relationship with a suitable gatekeeper and also served to strengthen the working conceptualisation of access negotiations as an on-going process (open to mis-interpretation) rather than a once-and-for-all event.

4.4.3 ESTABLISHING AND MAINTAINING AN APPROPRIATE ROLE FOR THE RESEARCHER

Section 3.3.1.3 highlighted the importance of establishing a suitable marginal role for a researcher so that rich insights could be gathered. However, identifying a role that supported a position of both insider and outsider seemed a daunting prospect at the outset of the exploratory study. The role would have to be "played" continuously and

convincingly if informants were to fit me into the desired behavioural model. Ideally the role would have to come naturally.

The decision was therefore taken to emphasise attributes of my background and interests which marked me out as a modern-day equivalent of Lofland's (1971) "acceptable incompetent". My status as a newly-registered PhD student was considered to contribute in this regard, but perceptions of my full-time position as a senior lecturer in a university business school were regarded as a potential source of dissonance. The decision was therefore taken to emphasise my skills in Information Technology (IT), with a view to benefiting from the popular portrayal of IT experts as potentially useful but slightly "out of touch" (Smith and McKeen, 1992). By emphasising the role of an IT expert who was keen to learn about environmental management, it was hoped that informants would consider it in their interest to make the 'techie' understand so that my contribution could actually be of use to them.

In order to establish this role, the initial letter of approach provided details of my first degree in Information Systems Engineering and my previous position as a consultant with a leading IT and management consultancy. With the exception of the term "client-server", which was introduced to demonstrate familiarity with current IT trends, extreme care was exercised with the language of the letter to ensure that it helped to create an overall impression of an IT expert who could communicate in the language of business. Whilst it is hard to judge the success of attempts to manage what Goffman (1955) terms "personal front", it is interesting to note that Professor Green commented on the letter of approach in our first meeting, remarking that the letter "*looked like an M.B.A. thesis*" (Masters in Business Administration). Indeed, this unsolicited comment offers some initial support for the proposition that a researcher's sense of audience can contribute to the research process.

As the phrase "establish and maintain" has been designed to suggest, negotiating a suitable role for a researcher is not a once-and-for-all event; it requires continuous attention. As Parker (1974) noted, dress code can contribute to informants' models of (and hence behaviour towards) a researcher; it is thus important to record that 'smart-

casual' attire was worn for all meetings in an attempt to maintain the image of an approachable professional. In order to strengthen this image, careful attention was paid to the accuracy and detail of minutes of meetings. Minutes were written with a view to capturing the spirit of the meeting, as well as the facts that were gathered, and emphasis was always placed on ensuring a prompt return of attendance notes for validation and comment. (Section 4.6.3 provides further details).

As the exploratory study unfolded, my actions and those taken by WasteCo staff, resulted in constant repositioning of "the role of the researcher" on Junker's (1960) observer-participant continuum. Whilst sufficient space was always maintained for reflection, the distinction between outsider and insider was not always sharply drawn. This point is perhaps best illustrated by the "*snack*" sessions which punctuated the daily-life of the environmental monitoring team: on several occasions interviews were suspended so that I could participate in these brief asides from work, which ranged in focus from ice-cream to Formula 1 motor-racing. The emphasised 'IT expert' role also provoked an unanticipated willingness on the part of some informants to seek feedback from me on the approaches they had chosen to adopt for dealing with information problems, suggesting that they regarded me as more than just an observer.

Several informants appeared to regard contact with me as an opportunity for gaining reassurance as to the validity of their efforts, which had been undertaken outside of normal IT development channels. Such behaviour was not anticipated at the outset of the exploratory study, highlighting inadequacies in my initial sense of audience which subsequently drove the research process to examine issues of End User Computing (see section 4.6.1). Here again, the contribution of the sense of audience principle to the research process is evident.

It is interesting to note that this study is not alone in experiencing unanticipated behaviour arising from informants' perceptions of a researcher as a sympathetic expert. Fielding (1993b, pp. 165-6) draws attention to Van Maanen's "bizarre" experiences of being a recognised 'expert' on urban policing who, after refusing to surrender his fieldnotes for an inquiry into a police beating, was considered "sympathetic to street justice". Reflecting

on how the police had apparently 'acted up' for him following the event, Van Maanen (1982 quoted in Fielding 1993b) writes:

> "... in the abstract, relations in the field are such that the researcher is provided with trusted information of the sort necessary to both understand and empathise with the observed, but the researcher's presence itself creates little change or disturbance ... concretely, however, such relations wax and wane over the course of a study, approach or exceed the upper and lower limits with different individuals on the scene and vary according to the practical situation." (p. 138).

This section has demonstrated that establishing and maintaining an appropriate role for a researcher is a process that requires constant attention. The 'IT expert' role adopted for the exploratory study was considered a successful interpretation of Lofland's (1971) "acceptable incompetent" as it created, sometimes unanticipated, opportunities to gain access to rich insights on the processes of managing environmental data within the context of WasteCo. Reflection on interaction with WasteCo employees, particularly their behaviour towards an 'IT expert', provided additional questions for the research agenda guiding the exploratory study. The techniques used to gather insights relevant to that agenda are now described.

4.5 GATHERING DATA

Section 4.3 established the focus for this exploratory study as an investigation of how environmental data could be integrated to produce meaningful insights, arguing that this encompassed the research agenda developed in Chapter 2 (and summarised on page 46). Later, through the process of 'getting in and getting on' with WasteCo personnel, the research agenda gained clarity as notions of ownership and responsibility for information provision gave direction to the item on perceptions and action (section 2.3.6). Using the initial research agenda as a point of departure, a brainstorming exercise was undertaken and a series of opening questions was produced to facilitate design of a data-gathering strategy (Newell, 1993, p. 98). The result of that exercise is shown below:

- *What goes on here ?*

- *What are your major responsibilities ?*
- *What has the greatest influence over the work you do ?*
- *With whom do you work regularly ?*
- *What information do you draw upon to get your work done ?*
- *How do you recognise 'important' information ?*

A series of questions was also produced which were designed to explore informants' specific views on processes for collecting and organising environmental data:

- *What environmental data are collected ?*
- *From where ?*
- *When / how often ?*
- *By what means ?*
- *Who is responsible for collecting the data ?*
- *Who/what determines whether these data should be collected ?*
- *Who makes use of the data ?*
- *How is the data used ?*
- *How else could the data be (usefully) used ?*

As these questions were shaped by an emerging sense of audience, this initial brainstorming exercise provided an articulation of that sense at the outset of the data-gathering process. Whilst informing the data-gathering strategy, it did not provide a blueprint for conducting research activities. With an agreed time frame of only one month for the exploratory study and a large and varied workforce at WasteCo, it was clear that careful and constant attention would need to be paid to the selection, design and recording of research encounters. The outcome of that deliberation is now described.

4.5.1 SELECTING RESEARCH ENCOUNTERS

Section 3.3.2.1 established the validity of an emergent data-gathering strategy, informed by a researcher's emerging appreciation of the situation being studied. However, it also highlighted the importance of planning research encounters that seemed most likely to contribute towards theory development. Given the one-month window that had been

agreed for on-site contact with WasteCo personnel, an effective strategy for selecting research encounters needed to be found which advanced understanding of ways in which environmental data could be integrated to produce meaningful insights, within a relatively short time period. After consultation with Professor Green, it was agreed that following the network of people involved in WasteCo's environmental monitoring activities appeared to constitute the best use of time. Environmental monitoring team leaders, Ms Yellow and Mr Orange, were identified as being the most useful "first port of call" and it was agreed that all informants would be invited to suggest further contacts for me to follow up. The chosen personnel encounter strategy could therefore be described as a synthesis of the 'snowballing' (Arber, 1993) and 'theoretical sampling' (Glaser and Strauss, 1967) techniques reviewed in section 3.3.2.1. Figure 4-1, below, shows the network of interviews undertaken in the exploratory study.

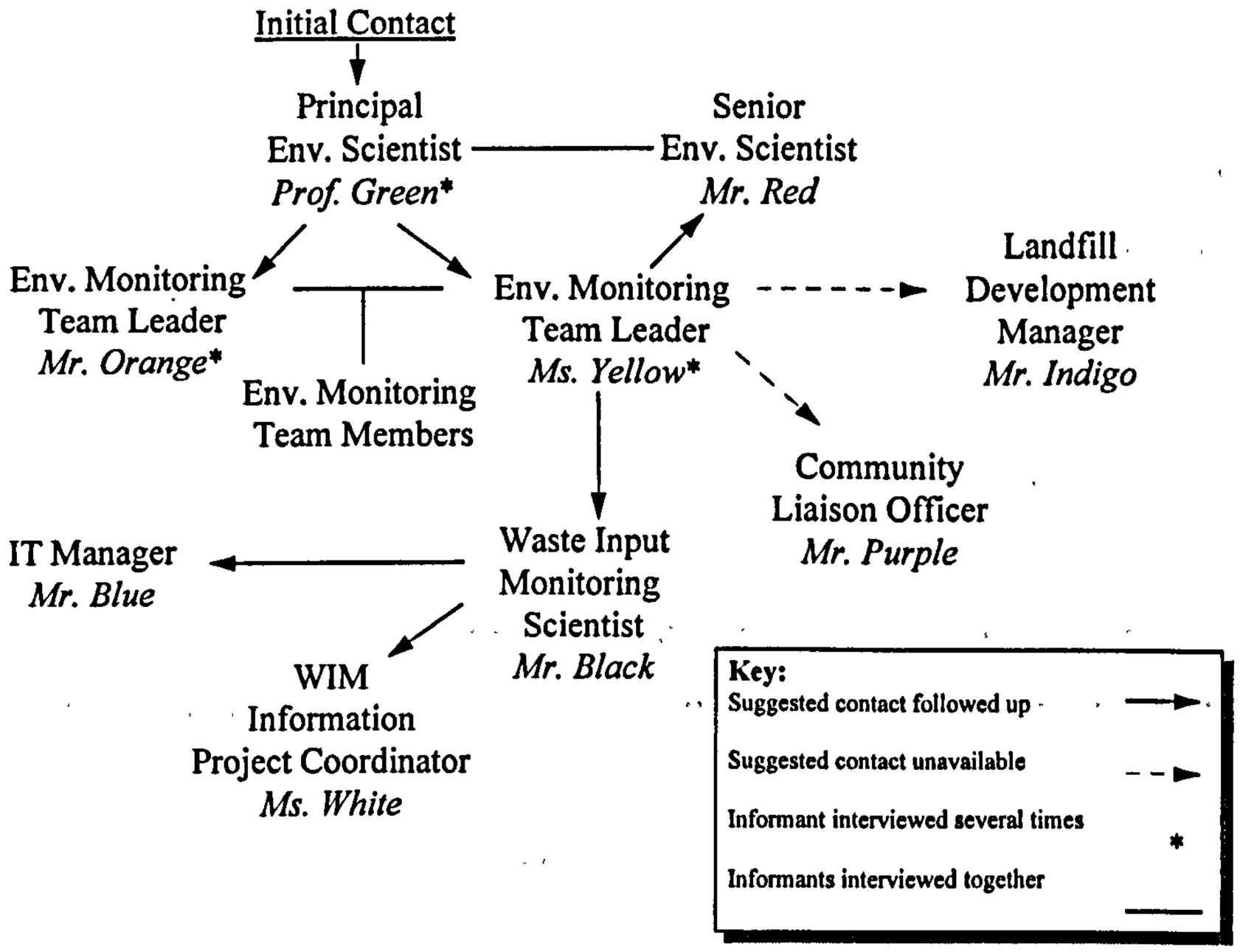


Figure 4-1 Network of encounters in the exploratory study

Figure 4-1 illustrates clearly the exploratory study's attempt to follow the network of actors involved in collecting, managing and using environmental data within WasteCo. It reveals the centrality of the support provided by Ms Yellow, one of the two

Environmental Monitoring Team Leaders. It also draws attention to two unsuccessful attempts to arrange interviews with suggested informants. The Community Liaison Officer was contacted by telephone but was unable to commit to a meeting because of workload. An attempt to contact the Landfill Development Manager was similarly unsuccessful despite making a visit to the sales office with Ms Yellow, who was prepared to provide a personal introduction. Whilst disappointing, these unsuccessful contacts initially appeared to be on the periphery of the environmental data integration issue and were therefore not deemed to have affected the study unduly. In fact, background information on the duties and needs of the community liaison officer was later gleaned second-hand from contact with the coordinator of the odour-monitoring research project mentioned earlier (section 4.4).

So far, discussion of research encounters has been restricted to consideration of interviews with informants; however, a major reason behind the decision to choose WasteCo for the exploratory study was the range of potentially useful texts and artefacts available to support the research process (section 4.4.1.5). The stringent monitoring regime for UK landfill operations, enforced by legislation, meant that a wealth of documentation was potentially available. Environmental monitoring reports are produced regularly for each landfill site as a condition of a site's operating licence (HMSO, 1994). Site operating licences are supplemented by technical guidance documentation from the Department of the Environment which prescribe activities such as monitoring regimes (eg DoE, 1993b, 1994) . Samples of this documentation were therefore used to provide "data triangulation" (Denzin, 1970) for the informant interviews, although care was taken not to breach the condition of access agreed with Professor Green, that internal reports containing analysis of environmental data could not be taken off-site without written permission.

In addition to documentation pertaining to environmental monitoring, the research encounter strategy also included analysis of computer systems designed to handle environmental data. The strategy for interpreting these artefacts is described later (in section 4.5.2), but it is important to note that these systems were also used to provide "data triangulation" for informant interviews.

4.5.1.1 REFLECTING UPON THE ENCOUNTER STRATEGY ADOPTED

It is useful at this stage to reflect upon limitations imposed by the chosen encounter strategy. However, this evaluation must be undertaken with the aims of the exploratory study clearly in mind. Chapter 3 has explained why a static, quantitative assessment of the 'representativeness of the sample' would contribute little to an evaluation of the encounter strategy adopted. As the exploratory study sought to reveal significant variety in the views of those with interests in data pertaining to WasteCo's environmental performance, a more useful evaluation of the research encounter strategy would be a qualitative assessment of the extent to which such variety was revealed.

When performing this evaluation one is immediately directed to considering *significant* variety amongst perceptions. In so doing, it is important to note any regularly-used classifications. Here it is useful to note that waste management legislation introduces a concept of "technically-competent persons" - approved decision-makers with appropriate expertise to assess environmental risks (DoE, 1993b; HMSO, 1994). The research encounter strategy adopted for the exploratory study ensured that WasteCo's technically-competent persons with specific environmental responsibilities were interviewed. Whilst this is clearly encouraging, an evaluation of the research encounter strategy in terms of stakeholders (section 2.3.2) in environmental data at WasteCo, reveals some weaknesses in the approach.

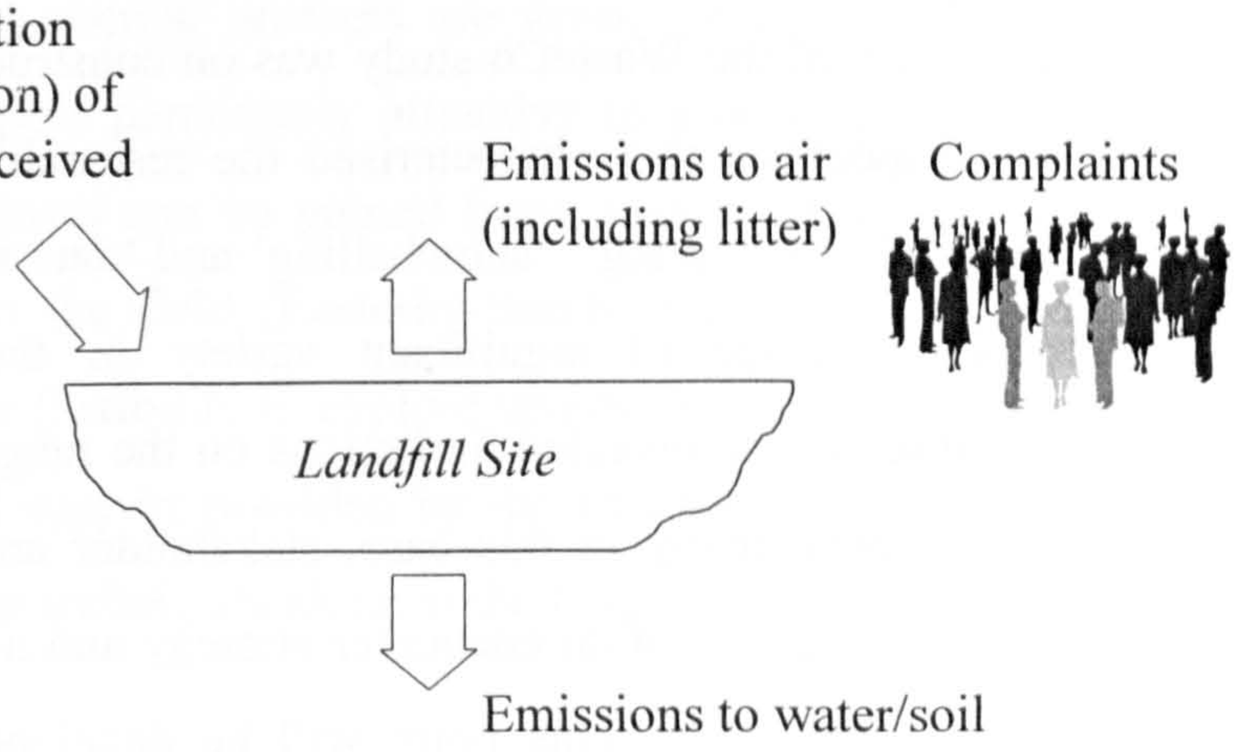


Figure 4-2 Key sources of WasteCo's environmental data

Figure 4-2 illustrates the key sources of environmental data collected by WasteCo; comparison with the coverage provided by the informant interview network shown in Figure 4-1 reveals that a key dimension missing from the exploratory study is the neighbouring community's perceptions of WasteCo's environmental performance. This dimension is the subject of on-going research work at Cranfield's IERC and, whilst it is unfortunate that an interview with WasteCo's Community Liaison Officer could not be arranged, preliminary findings from the IERC research did inform the exploratory study on an ad-hoc basis.

Stakeholder analysis also highlighted an additional perspective on which deeper understanding could have been gained: the Waste Regulatory Authority (WRA) - the (then) public body which required regular environmental data to be sent as a condition of the landfill operating licences it issued (HMSO, 1994). The encounter strategy relied on licences and technical guidance documentation issued by the Department of the Environment to stand for the WRA perspective. On reflection, this could have been usefully supplemented by an interview with an WRA informant responsible for authorising WasteCo's operations.

It is clear from the exploratory study that selecting research encounters is a process in which careful planning and preparation must be blended with a willingness to pursue encounters which were not anticipated at the outset of the study but are added to the research agenda as a result of an emerging appreciation of the situation being investigated. The emphasis of the WasteCo study was on constructing an understanding of the multitude of perspectives that characterised the research setting; its encounter strategy based on 'theoretical sampling', 'snowballing' and 'data triangulation' appeared to provide reasonable coverage of significant variety in those perspectives, but stakeholder analysis subsequently revealed limitations on the range of insights gathered. Although undertaken retrospectively in this case, stakeholder analysis has highlighted how reflections upon the adequacy of an encounter strategy and a researcher's emerging sense of audience are intertwined. This point will be developed in the accounts of

fieldwork which follow in later chapters. The following section now explains how research instruments were chosen for the encounters described.

4.5.2 EMPLOYING APPROPRIATE RESEARCH INSTRUMENTS

When contemplating the design of research instruments it is important to give consideration to the setting in which they will be used and to how data gathered will be analysed (Fielding, 1993a; Newell, 1993). In accordance with the research agenda developed in Chapter 2, the encounter strategy for the exploratory study attempted to follow the network of actors involved in collecting and using environmental data, with a view to revealing significant variety in their perceptions of the process and of the organisational setting in which it was situated. In order to discern research instruments suitable for gathering insights into both the process and context of WasteCo's efforts to provide environmental information, three interlinked questions had to be answered:

- What (if any) structure will be placed upon research encounters ?
- How will research encounters be recorded ?
- How will research encounters be analysed ?

Encounters with informants can vary from being highly structured to unstructured, with associated research instruments varying from formal questionnaires, in which the same questions are given to each respondent, to informal, individual chats (Fielding, 1993a). The latter has advantages in terms of the flexibility it offers for exploring diverse appreciations of situations (Fielding, 1993a); the former has advantages for analysing the frequency with which similar answers are given (Newell, 1993). Also, delivering a questionnaire can appear particularly attractive to a new researcher as feedback on its strengths and weaknesses can be gained from more experienced colleagues before the instrument is used in the field (Easterby-Smith et al., 1991; Newell, 1993). A new researcher seeking the flexibility to explore diverse appreciations of situations is likely to lack the comfort and support provided by the structured approach, as s/he will have to develop data gathering techniques alone in the field.

With the relative merits of options for structuring research encounters in mind, semi-structured interviews were chosen as the most appropriate instrument for gathering insights from informants. This decision to use semi-structured interviews or "guided conversations" (Lofland, 1971) as the main research instrument for the study is consistent with the adaptive approach to research described in Chapter 3. Furthermore, guided conversations are particularly well-suited to the exploratory study's aim of revealing significant variety in the views of those involved in the process of collecting and using environmental data at WasteCo. Preparation for an encounter is informed by a researcher's sense of audience and consists primarily of identifying themes that will be explored with the informant. Inherent flexibility in the research instrument enables a researcher to pursue and to validate lines of inquiry and analysis with the informant during the encounter. The instrument can therefore respond to a researcher's emerging sense of audience.

Using 'guided conversation', question design and data analysis become mutually informing on-going tasks rather than discrete events. However, the value of reflecting upon encounters away from the research setting should not be underestimated (Fielding, 1993b). Opportunities for undertaking deeper analysis, away from the pressures of the field, are contingent upon the record of the encounter on which the analysis will be performed. This raises the question of how encounters will be recorded and highlights, in particular, the importance of a researcher's field notes. As Fielding (1993b) observes:

> "The production of fieldnotes is the observer's raison d'être: if you do not record what happens you might as well not be in the setting." (p. 161)

After giving detailed consideration to the advantages and disadvantages of tape recording research encounters (see, for instance, Easterby-Smith et al., 1991; Hammersley and Atkinson, 1983, pp. 157-161), I decided initially to follow Fielding's (1993a) advice and "tape-record whenever possible" (p. 146). As the exploratory study sought to reveal variety in informants' views, the detail that would be captured by tape-recording conversations seemed a valuable supplement to notes and observations written in a notebook. However, on arrival at WasteCo it soon became clear that tape-recording was

not a viable option. The exploratory study was undertaken during a particularly hot August and motorised electric fans and open windows were being used to moderate the temperature in the building. The resulting level of background noise meant that an alternative interview-recording strategy had to be adopted.

A technique of note-taking was developed during the interviews that focused on capturing key phrases and noting links between them. The technique was very similar to Fielding's (1993b) description of "jotted notes":

> "In taking jotted notes you do not record everything that took place, as in full fieldnotes. Rather, you note key words, phrases or quotations which represent more extensive chunks of verbal and non-verbal behaviour, and which will stimulate the memory when you are at leisure to reconstruct the events as comprehensively as such notes and your memory will permit." (p. 161).

Notes from research encounters and other observations were recorded in a field note book. Detailed minutes of meetings were reconstructed from the fieldnotes at the first opportunity away from the research setting. As Fielding (1993b) observes:

> "Erosion of memory is not related to time so strongly as to new input; the more stimuli to which you are subjected during a day the more detail is forced out. It is a good idea, then, to write up fieldnotes before engaging in further interaction after a round of observation." (p. 161).

Minutes of meetings were returned to informants so that they could comment on the accuracy and completeness of the record produced. (Section 4.6.3 provides further details). The detail captured through the technique appeared to "*amaze*" informants when minutes were returned for validation. One informant informed a colleague at Cranfield that he had "*never attended meetings in which such detailed notes were taken !*".

Fieldnotes were not restricted to records of informant interviews. Impressions of WasteCo's sites and building, and observations about working practices were also noted,

with a view to 'triangulating' interview data. For instance, notes were taken about temporary buildings that characterised operations at the landfill sites as these buildings gave the impression of a short-term commitment, contrary to the espoused long-term commitment to managing the site. Notes of impressions and observations were therefore not simply used to support insights gleaned from interviews, they frequently provided avenues to explore in conversation. For instance, first impressions of the layout of WasteCo's headquarters (described in section 4.4.2) indicated that close-knit teamworking appeared to be the norm and thus suggested that communication between departments might present problems. Interviews were therefore directed towards considering the extent to which useful data and expertise were shared across departmental boundaries.

The field note book was also used to record my interpretations of texts and artefacts that were encountered. In order to appreciate assumptions embodied in the various computer systems, informants were encouraged to use the language of "data modelling" to explain significant concepts represented within the systems. This language can provide a succinct method of highlighting items of significance within a computer system and can reveal important relationships between those items (Lewis, 1994). Not all informants were familiar at first with the notation used for data modelling but, by the end of the study, data models appeared to provide an effective means of sharing understanding about:

- what constituted significant data;
- how those data could be usefully clustered and
- how the resulting clusters were inter-related.

Following Walsham's (1993) suggestions on interpreting information systems, consideration was also given to resource-allocation principles and norms that appeared to be embedded in the systems. For instance, data pertaining to each landfill site was managed separately on the stand-alone computer used by the environmental-monitoring team; this suggested that comparison across sites was not a regular electronic activity. The research instrument used for interpreting WasteCo's computer systems could thus be likened to Walsham's (1993) adaptation of Gidden's (1984) meta-framework for revealing processes of structuration.

A major aim of the exploratory study was to develop research skills prior to commencing the central study. Emphasis on 'guided conversation' as a central research instrument enabled interviewing and note-taking skills to be developed. The setting also provided opportunities to experiment with approaches for interpreting a range of texts and artefacts, and valuable experience was gained in operationalising the concept of "data triangulation". The next section considers the interpretation and analysis of data gathered using the instruments described.

4.6 GENERATING THEORY

Attempts were made throughout the exploratory study, to make sense of encounters with personnel and with texts and artefacts in 'circulation' at WasteCo. The following three sections offer insight into the rigour with which that sense-making process was approached.

4.6.1 DEVELOPING THEORETICAL SENSITIVITY

Section 4.3 has already highlighted a contribution to the sense-making process from my prior familiarity with the theory and practice of information technologies in organisations. However, in order to enhance sensitivity to useful theories and concepts, three areas of published work were systematically explored with WasteCo in mind:

- the IS literature was re-visited;
- literature on organisational learning was examined; and
- literature on the practice of waste management was analysed.

Informants' apparent desire to seek legitimation for IT development efforts conducted *"outside of normal channels"*, suggested that studies of End-User Computing (EUC) might offer an enlightening avenue of inquiry. Also, informants' concerns over data ownership added further direction for a search, particularly when worries over control of access to environmental data were seen in the context of an impending move towards a

corporate computing environment. With these areas in mind, a directed search of the IS literature was undertaken which highlighted the following:

Relationships between those responsible for providing IS and those who use IS are often characterised by conflict. Such conflict often arises over the locus of decision-making, the strategies and time frames used in implementing change, the perceptions of benefits to be attained, and the allocation of responsibilities for system development (Smith and McKeen, 1992; Walsham, 1993). Frustration, lack of trust and communication difficulties can be the unfortunate result, with a growing number of end-users assuming responsibility for developing computer systems without the support of 'official' IS providers (Galletta and Hufnagel, 1992). EUC brings both advantages and disadvantages: enthusiasm and detailed knowledge of business processes can facilitate systems development but resources and IT expertise may not be available to ensure that locally-developed systems are robust. Furthermore, "information islands" and "re-inventing the wheel" can be difficult to avoid (Robson, 1994). Strategies for managing and controlling EUC have been receiving attention from IS researchers for some time (eg. Alavi et al., 1987, and Munro et al., 1987), and there is now some agreement amongst prescriptions for progress, particularly concerning the value of clear policy for defining responsibilities, and on prototyping, co-locating IS and business staff, and mutual training, as mechanisms for developing shared understanding between IS providers and users (Galletta and Hufnagel, 1992; Smith and McKeen, 1992).

In conversation, several informants raised issues related to the development and sharing of knowledge necessary for interpreting environmental data (section 4.6.2). Following Schön (1983), literature on individual and group learning in the context of organisations was considered potentially enlightening for interpreting the WasteCo situation:

> "As the observer begins to suspect that he is in the presence of an unfolding story of organisational learning, he reorients the inquiry so as to trace that story." (p. 126)

Theoretical sensitivity to perform this interpretation was developed through a review of the work of authors such as Argyris (1993), Hedberg (1981), Kim (1993), Pedler et al. (1991), Schön (1983) and Senge (1990), which revealed the following.

Of central concern within literature pursuing the metaphor of 'organisational learning' is how an individual's learning experiences contribute to understanding shared by a group. Whilst definitions of learning vary, models of individual learning tend to be presented as a continuous cycle, moving through concrete experience, reflection, formation of abstract concepts and testing - this then leads again to concrete experience (see, for instance, Argyris and Schön, 1978; Kolb 1984; Zuber-Skerrit 1992b). This cycle (re)produces an individual's mental model of the world around them; thus individual learning can be seen as:

> "... a cycle of conceptual and operational learning that informs and is informed by mental models" (Kim, 1993, p. 40).

Whilst the relationship between individual and group learning is not well understood, surfacing and learning from individuals' mental models is seen as a potential mechanism for developing understanding shared by a group (Kim, 1993; Senge, 1990). However, it is a mechanism that is not embedded in the day-to-day routine of many organisations; mental models are usually taken-for-granted and deep reflection upon the appropriateness of working assumptions is not the norm (Argyris, 1993). Indeed, organisational routine and the structures it (re)produces often present barriers to learning, particularly if an individual views her/his role as constraining but unchallengeable - a phenomenon Senge (1990) describes as the "learning disability" of "I am my position". Such "role-constrained learning" is an example of what March and Olsen (1975) describe as an incomplete learning cycle - links in the learning cycle can become weak or broken with action being constrained or feedback being difficult to discern.

Although the literature is "still in its embryonic stage" (Kim, 1993), recurring themes of sharing mental models and of barriers to learning characterised by rigid functional roles, poor feedback and limited opportunities for reflection, can be detected. It is therefore

important to note contributions from these themes, to theoretical sensitivity drawn upon in the process of analysis.

Whilst the other two literatures provided an opportunity to bring ideas across from contexts other than waste management, the third area of published work concerned the particular problems and opportunities experienced in this context. Literature on waste management revealed a number of problems facing operators. Most of these seemed to arise from uncertainty about inputs and outputs of the waste management process and regarding the policy context in which it took place. Greaves (1994), for instance, highlights the enduring nature of Wolbeck's concerns regarding information on the composition of wastes being received for disposal:

> "... adequate knowledge on the composition of wastes, for example, does not exist even at the factory level where these wastes are generated." (Wolbeck, 1977, p. 28)

Lemon et al. (1994) note the problems that waste management operators face in providing a society-level service in which the disbenefits are felt locally. In particular, they note how the pathways through which such disbenefits are felt by neighbouring communities can often be difficult to appreciate, yet require equal attention to environmental monitoring undertaken to meet waste management licence obligations. When these problems, of monitoring inputs and outputs to a process that is currently the subject of considerable debate (section 4.4.1.2), are set against the changing policy framework that surrounds waste management in the UK (section 4.4.1.2), the complex and multi-faceted nature of the issues faced by operators, such as WasteCo, becomes clear.

4.6.2 ANALYSING DATA

Section 4.5.2 has already described how lack of congruence between espoused theories and observations drove the combined process of data gathering and analysis in the field; this section therefore concentrates on analysis undertaken at the end of the field work. Here, the main method of analysis was a systematic coding exercise designed to integrate insights from the field with those gained from relevant literatures.

The coding process was strongly influenced by Strauss and Corbin's (1990) description of "selective coding around a storyline" (pp. 116-42). Analysis was guided by a central storyline concerning *how a group of actors in WasteCo collect and organise environmental data to produce meaningful insights.* With this "story" in mind, fieldnotes, summarised relevant literature (see section 4.6.1), and validated informant interviews were examined and notes were made of what appeared to be major themes within them. Constant comparison between data sources ensured triangulation, and themes were cross-referenced with the material in which they were grounded. Each potentially new theme was compared against those already identified to ensure that it did appear to be unique; it was then written on a piece of card and placed on a large flat surface. Themes were studied with a view to identifying obvious clusters. Cards were then re-positioned in these clusters (as appropriate) and a new card summarising the cluster was placed on top.

An example is now shown of how the theme area expressed as "interpreting environmental data requires familiarity with the data and a deep knowledge of processes and local conditions", was derived:

Theme: **mental models** Source: literature: Senge (1990) and Kim (1993)

Theme: **sophisticated mental models used when working with data** Source: interview 08/08/95 Mr. Black *"Often the description of the waste which [WasteCo] scientists receive lacks precision (... [Mr. Black] pointed out 'people are more interested in getting rid of waste rather than spending money working out exactly what it is') and the scientists are required to draw upon a knowledge of local industry and some educated guesswork when selecting appropriate tests. [Mr. Black] demonstrated this point with an example of waste [formally] described as 'grey sludge' which had been received from a local motor-vehicle manufacturer. [Mr. Black] explained that he suspected 'grey sludge' was most*

likely to result from a plating process or from painting, and described how his choice of laboratory tests would be based upon this suspicion."

Theme: **mental pictures used to interpret data**

Source: interview 04/09/95 Professor Green & Mr. Red

"[Mr. Red] then described the rules and resources he drew upon when analysing surface water data sets. ... He described how an analysis of an isolated body of water was more complex and required a 'clear mental picture of what things are supposed to be like in your head'. [Mr. Red] described how this mental picture had to accommodate an interaction of processes - some of which were very slow to manifest themselves in an obvious way. [Professor Green] explained that he too drew upon mental pictures when analysing data. He described a '5 dimensional picture' involving levels over time, spatial location and quality considerations. [Mr. Red] explained that a picture 'needs to take into account the time of the year' as 'water runs faster in winter' and he described how he often looked for evidence to support particular seasonal explanations such as algal blooms forming with increasing temperatures."

Theme: **recognising significant data requires familiarity**

Source: interview 03/08/95, Ms. Yellow and Mr. Orange

"[Ms. Yellow] explained that describing how she or her colleagues recognised 'significant' measurements was difficult to put into words but seemed to come from a 'familiarity' with the data. [Mr. Orange] used the word 'experience' to summarise this ability ..."

Once this clustering exercise was complete, consideration was given to relationships between clusters and a diagram summarising the constellation of major theme areas was produced. Arrows were added to the diagram to guide a reader's eye around the themes. It is important, here, to emphasise that these arrows were not intended as a study of causation. The diagram representing the constellation of major themes revealed following the month of intensive study, is shown below (Figure 4-3):

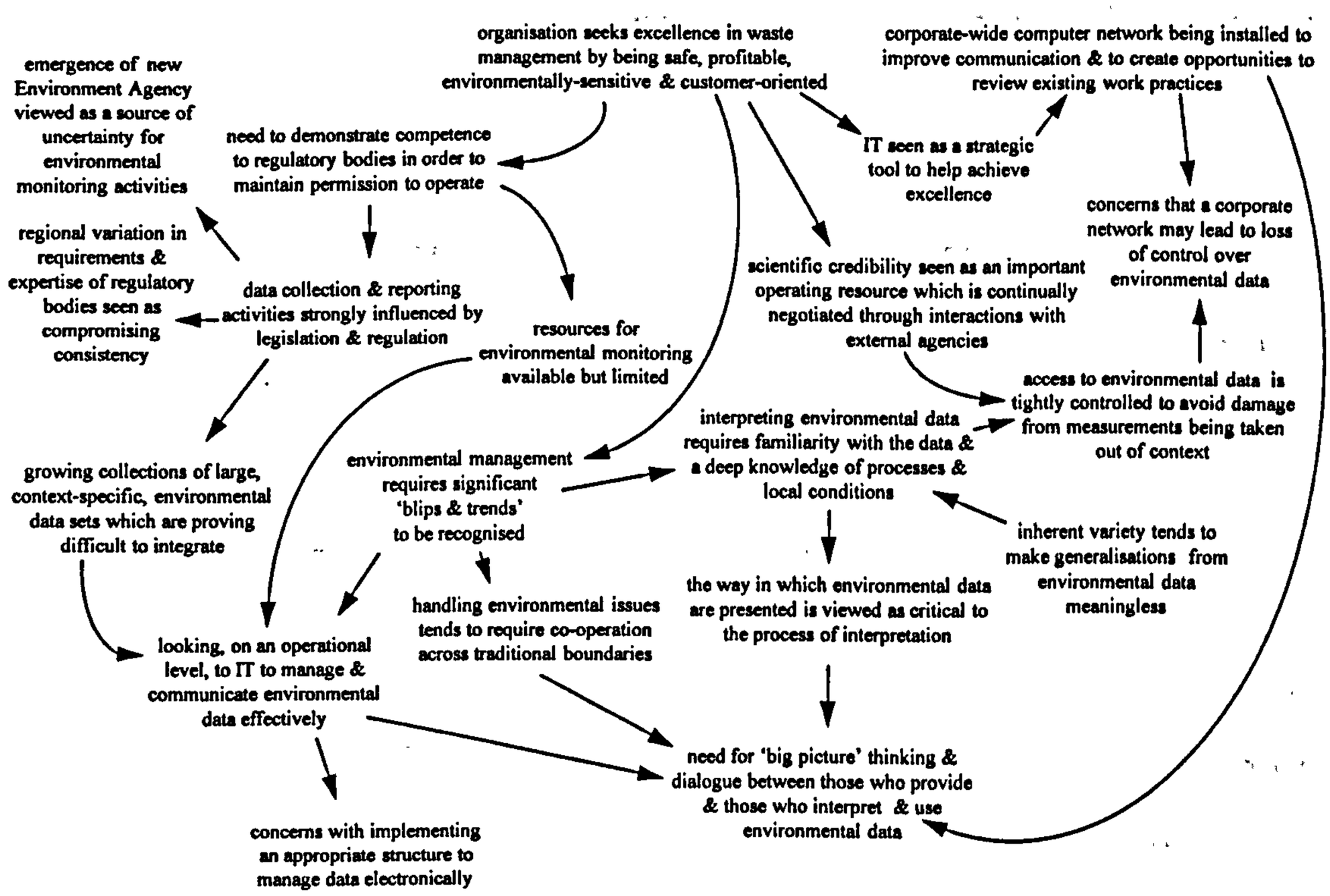


Figure 4-3 Map of emergent themes from the exploratory study

The diagram produced can be compared with the output from cognitive mapping (Eden, 1988), however it should be noted that the approach used to represent themes was not subject to the constraints suggested by Ackermann et al. (1991) for improving the "action-orientation" of cognitive maps. It did not place concepts in the imperative form and it did not use arrows to show means leading to desired ends. It did, however, use the natural language of those who had been consulted in the production of the map.

Earlier in this chapter, the important role of the exploratory study in developing research skills prior to the central study was highlighted (section 4.1). The systematic coding exercise described above was a deliberate attempt to undertake analysis that was informed, but not constrained, by the literature; it therefore provided valuable experience of attempting to exercise disciplined scientific imagination (section 3.3.3.2). Furthermore, although I was aware of software that claimed to support the coding process (see, for instance Fielding and Lee, 1991), the manual approach provided an explicit, step-by-step introduction to coding. The approach also offered high levels of flexibility for

experimentation. Skills in data analysis gained "back home" (Gilbert, 1993) complemented those gained in the field, ensuring that the exploratory study achieved its aim of developing my familiarity with research technique.

4.6.3 VALIDATING EMERGING CONCEPTS AND THEORIES

When considering the validity of the outcome of data analysis it is important to consider both the usefulness of the outcome and the rigour of the process through which it was derived. Indeed, section 3.3.3.3 has argued that it is helpful to conceptualise assessing validity as a conversation about the usefulness of, and limitations upon, the insights a researcher has gathered. Consideration of limitations necessitates reflection upon the coverage provided by the encounter strategy and the extent to which records of encounters reflect reality for the informants. The former is provided in section 4.5.1.1; the latter is discussed here.

Within the exploratory study a strategy of informant validation was used to ensure the fidelity of accounts of research encounters. For each meeting, word-processed minutes were reconstructed from field notes, taken at the time, and these were returned to informants with a request to confirm their accuracy and completeness. The typical wording used in such requests is shown below:

> *"... Hope I got things somewhere near ! Please feel free to suggest <u>any</u> changes, or to point out <u>any</u> mistakes or misinterpretations. Thanks again for your time ..."*

Responses would either take the form of annotated corrections, or a confirmation of accuracy, such as:

> *"... I've now had an opportunity to go through them ... and I am happy that you have covered everything that was talked about in sufficient detail and there were no salient points missing. ..." (Communication from Ms. White, 31/08/95)*

The previous section identified two phases of data analysis: analysis that was on-going in the field, and analysis undertaken back home. The strategy of informant validation made a direct contribution to the validity of the former and an indirect contribution to the latter. At one level, validation was provided by feedback from informants during face-to-face meetings, for example:

> *"The researcher concluded by asking [Mr. Red] and [Professor Green] whether they felt that the notion of 'lots of data but little information' was a reasonable theme to pursue within his PhD. Both agreed that it was a major concern in attempts to provide environmental information and Professor Green said he looked forward to a copy of the thesis ..."*
> *(Meeting with Professor Green and Mr. Red, 04/09/95)*

At a second level, the strategy of inviting informants to validate typed minutes enabled them to reflect upon what had been said and to make additional comments as they felt appropriate. This, together with the systematic and grounded approach to coding undertaken away from the field (section 4.6.2), demonstrates the rigour with which important concepts were identified.

Judging the usefulness of concepts identified in the exploratory study clearly requires consideration of audience. In other words, for whom are they useful ? It is therefore considered more fully in the sections that follow. However, interactions with some informants pointed to an immediate practical contribution from ideas introduced through my inquiries. For example, discussion about how environmental reports could be produced from a database resulted in one informant remarking that:

> *"... he hadn't been aware of this feature of relational database report-writers but he was sure that it could be useful in this and other areas ..."*
> *(Mr. Orange, 04/09/95).*

Also, an exercise I had undertaken to calculate the volume of environmental data collected - in which it was revealed that approximately 90,000 readings were taken each

year - was consistently referred to in subsequent discussions about storing and managing environmental data.

4.7 COMMUNICATING FINDINGS

When planning to communicate research findings it is important to keep in mind potential audiences, agreements made during access negotiations, and the overall purpose of the research (Chapter 3). In addition to providing a vehicle for developing research technique, the exploratory study was directed towards facilitating a move away from WasteCo's 'lots of data but little information' scenario. In order to achieve this, research activities were designed to reveal pertinent actors' perceptions of the process of collecting and interpreting environmental data and to explore how that process was being shaped by (and was shaping) the organisation setting in which it was occurring. A strategy for communicating the findings of the study therefore had to accommodate multiple perspectives. How this communication was executed for those with interests in the findings is now considered.

4.7.1 IDENTIFYING AUDIENCES

The most obvious audience for findings from the fieldwork are the employees within WasteCo who work with environmental information. However, as highlighted earlier, this audience is characterised by different perspectives, and reflection upon each other's views is not a matter of routine:

> *"From her interviews with site personnel [Ms. White] had gained a strong feeling that different areas of the site focused on the detail required for completion of their work without considering how their activities and information fitted in the running of the whole site. In order to understand the linkages between different activity areas [Ms. White] had explored some 'worst case scenarios' with staff although she expressed some concerns about how the staff interpreted her attempts to 'make 'em think'" (Ms. White, 22/08/95)*

Revealing perceptual variety, so that it might be debated within WasteCo, was an imperative for designing effective communication that was inspired by the literature of organisational learning and shaped by my sense of audience. The actual format adopted for the communication is described in the next section.

Whilst WasteCo employees may be an obvious audience for the findings, they are not the only one. Individuals engaged in environmental management in other organisations may be facing similar information problems and academic peers may be interested in both the process and the findings of the exploratory study. The strong IT themes developed within the study also create opportunities to share findings with an audience interested in learning about IT in organisations. Each of these different audiences invites consideration of the exploratory study in a different light; I, therefore, decided to engage each of them. The following section describes the communication mechanisms used.

4.7.2 DESIGNING EFFECTIVE COMMUNICATION

The previous section identified four key audiences for findings from the exploratory study; communication strategies for each are now described:

4.7.2.1 FOR WASTECO STAFF

A concise consultancy-style report was chosen as the most appropriate format for enabling WasteCo employees to benefit from the findings from the exploratory study. As the study had set out to help WasteCo move beyond the scenario of 'lots of data but little information', a lasting and thought-provoking presentation of findings appeared to be the most suitable mechanism for contributing to on-going debate about managing environmental information within WasteCo. Alternatives, such as a presentation to senior management, were considered, but a report could be circulated amongst all those with an interest in environmental information. Furthermore, the asynchronous nature of report-based communication also created 'space' to reveal diverse appreciations of the process of collecting and using environmental data at WasteCo, as readers would be able to interpret the report at their leisure.

In order to encourage as wide a readership as possible within WasteCo, the Report was designed to be thought-provoking and extremely concise. The Report comprised a one-page summary of findings and areas deserving further consideration (incorporating Figure 4-3); one page of recommendations, incorporating suggestions for a data model (similar to Figure 4-4) for managing environmental data electronically; one page providing background to the study; and seven pages of interview summaries.

4.7.2.1.1 SUMMARISED FINDINGS AND RECOMMENDATIONS

In the first section, Figure 4-3 was used to identify areas deserving further consideration. The arrows added to the diagram led the eye to rest on five areas of concern that had been revealed in the study. In order to make the Report as thought-provoking as possible, each of these areas of concern was phrased as a problem, using the goal-oriented construct favoured by Rickards (1990), eg:

> "how to develop 'big picture' thinking and dialogue between those who provide and those who interpret and use environmental data ?"

4.7.2.1.2 RECOMMENDATIONS

As a consultancy style had been adopted for the Report, a section outlining recommendations for next steps seemed appropriate. Being mindful of Handy's caution about "stealing other people's decisions" (1994, p.20), care was taken to ensure that recommendations were presented in way that promoted debate, rather than told WasteCo what to do. Five suggestions were made regarding the areas of concern highlighted in the summary; each of these was:

> "... phrased as an 'ideal state of affairs' in order to encourage debate about a desirable and feasible pathway for improvement:" (WasteCo Report, p.2)

This 'ideal state of affairs' format was adopted as it drew the reader's attention to salient attributes of a possible future but left the reader free to consider how that future might be achieved. The format was therefore designed not to promote end-state-oriented thinking,

but rather to encourage debate about plausible pathways for achieving change that generally appeared desirable (Sperling, 1984). As the above quote demonstrates, this intention was communicated explicitly to readers of the Report.

4.7.2.1.2.1 Institutionalised Multi-level Dialogue

The first 'ideal' was that:

> "multi-level dialogue between those who provide and those who interpret and use environmental data is 'institutionalised' in day-to-day work routines".

This 'ideal' applied suggestions from the organisational learning literature on "dialogue" (Senge, 1990), and suggestions from the IS literature on "user participation" (Land and Hirscheim, 1983), to the problems and opportunities that informants had highlighted regarding environmental information, eg:

> *"[Mr Red] explained that 'when you've worked with data in a particular order for 15 years', a change to that order can 'throw you' even when column headings indicate the change clearly ... He described how 'familiarity' with the data sets on which he draws to identify significant data items, can be seriously compromised by a change in order of presentation, with data sets taking much longer to analyse. ... [Professor Green] described how he wanted 'to allow time for things to settle' and for the monitoring team to develop a sense of ownership for the way data are presented. [Professor Green] explained that he had invited the team to establish a 'quality circle' which would involve him and [Mr Red]"*
>
> (Meeting with Professor Green & Mr Red, 04/09/95)

Building on Giddens' (1984) observations on the role of routine in setting shared perceptions of what needs attending to and of ways in which such things may be achieved, this first 'ideal' aimed to highlight the need to embed multi-level dialogue in WasteCo's "ways of doings things" (Smircich, 1983). The study provided evidence of some movement along a pathway towards this 'ideal' - Professor Green's suggestion for a "quality circle" (reproduced above) would go some way towards establishing appropriate

dialogue; however, the study also indicated that participation could be usefully extended beyond the environmental monitoring team, eg:

> *"[Professor Green] explained that getting site maps into MSIMS [Environmental Monitoring's new computer system] had proved to be a difficult process as the Surveyors had entered all site details on one level of their GIS system which made separating the data the monitoring team needed very difficult."*
> (Meeting with Professor Green and Mr Red, 04/09/95)

The need to look beyond the boundaries of the environmental monitoring team when planning dialogue was emphasised in the Report by a suggested corporate environmental data model and by the details of other pertinent perspectives present in the interview summaries. The design of the Report as a whole was therefore made with a view to informing debate about the specific suggestions it offered.

4.7.2.1.2.2 Data Modelling Skills for Functional Experts

The second suggested 'ideal' was that:

> "functional experts receive training on managing environmental data and are able to articulate their efforts in the context of a corporate data model"

This suggestion was grounded in the literature of EUC and in the experiences of data modelling as a technique for structuring debate with informants (section 4.5.2). Research suggests that specialist functional knowledge can contribute significantly to the fidelity of data models (Land and Hirscheim, 1983) and, during the course of the study, it became clear that several functional experts were developing data base systems that would hold environmental information, ie. Ms. White, Mr Orange and Mr Black. The study revealed plans for the IT Department to subsume these efforts; however, more urgent commitments meant that environmental data integration was not a priority for the short-term. This second point was thus included to reinforce the suggested 'ideal' of integrating data across departmental boundaries introduced earlier in the Report. It also challenged the assumption that only IT department staff could be responsible for data modelling -

something which was already disputed by the EUC initiatives encountered in the study. This point was developed further in the third suggestion.

4.7.2.1.2.3 Local Ownership Drives Data Integration

The third suggested 'ideal' was that:

> "local expertise and ownership provides the basis for enterprise-wide integration of data"

This suggestion was included to stimulate debate regarding concerns about managing access to sensitive environmental information. Analysis of the fieldwork had revealed particular concerns about losing control over access to environmental data when the corporate-wide computer network was established (Figure 4-3). Following Alstyne et al.'s (1995) observations on ownership and control in database initiatives, an 'ideal' of *local* ownership was suggested as the guiding principle for corporate-wide integration of data. Against the backdrop of the level of concern expressed by informants and the imminent arrival of the corporate network, this suggestion can be regarded as a timely contribution. It is a contribution that is developed further in the fourth suggested ideal.

4.7.2.1.2.4 Improved Communication between IT Providers and Users

The fourth suggested 'ideal' was that:

> "regular dialogue between users and providers of information technologies highlights potential contributions from new technologies and allows users to voice concerns"

Grounded in prescriptions from the IS literature, particularly Keen and Cummins (1994) and Smith and McKeen (1992), the 'ideal' was intended to highlight the possibility of establishing a process for sharing appreciations of business needs and IT opportunities. The lack of congruence in agendas revealed in this area (and illustrated in section 4.7.1), whilst not atypical (Hackney and McBride, 1995), marked this out as deserving attention. By including interview summaries, the Report actually provided an illustration of the sharing of perspectives it suggested; the design of the Report as a whole, enabled readers

from different departments to discern similarities and differences in the way they and their colleagues saw the use of IT for environmental management at WasteCo.

4.7.2.1.2.5 Close Working Relationships with Regulators

The final suggested 'ideal' was that:

> "close working relationships with the Environment Agency allow concerns over consistency and appropriateness of monitoring regimes to be discussed"

As section 4.4.1.2 highlighted, the study was undertaken during a period of change for UK environmental regulators - the National Rivers Authority (NRA), the Waste Regulatory Authorities (WRAs) and Her Majesty's Inspectorate of Pollution (HMIP) were being integrated under the umbrella of the UK Environment Agency. As the study revealed, this change had created uncertainty for WasteCo employees:

> *"[Professor Green] explained how the WRAs were likely to be facing some awkward reorganisation in the process of reflecting political boundaries within the new Environment Agency. He described how this presented [WasteCo] with some uncertainty as to exactly who they'd be dealing with and he suggested that it would be 'seven to eight months' before the new 'Agency' found its feet."*
> (Professor Green, 04/09/95)

Following the stakeholder theories of environmental management reviewed in Chapter 2, and particularly suggestions for active dialogue with interested parties (Peattie, 1995), this final 'ideal' advocated a proactive stance to negotiating working relationships with the new Environment Agency. Insights gleaned from the trade literature and from WasteCo informants, indicated that those responsible for regulating WasteCo's operations were likely to be experiencing significant disruption to work routines as they came to terms with an integrated environmental remit. The suggestion of adopting a proactive role in raising issues such as the consistency and appropriateness of monitoring regimes (Figure 4-3), can therefore be regarded as particularly timely.

4.7.2.1.3 A MODEL FOR MANAGING ENVIRONMENTAL DATA ELECTRONICALLY

To illustrate the second and third suggestions, a simplified relational data model was proposed to promote debate about storing environmental data electronically at WasteCo. Based on informants' descriptions of data deemed important to store, data items were grouped into tables of related attributes that ensured minimum levels of data redundancy (Date, 1995). Potentially useful links between tables were added to show how data stored in separate tables could be joined to provide integrated reports. Examples of such reports were included in an appendix to the Report, together with observations on the model's limitations.

One notable limitation concerned the non-standard format used for presenting the model. Structured Systems Analysis and Design Methodology (SSADM) diagramming conventions were deliberately avoided in an attempt to improve readability of the model for WasteCo employees. Here, however, it is appropriate to reproduce the version of the model that follows SSADM convention (Meldrum et al., 1993):

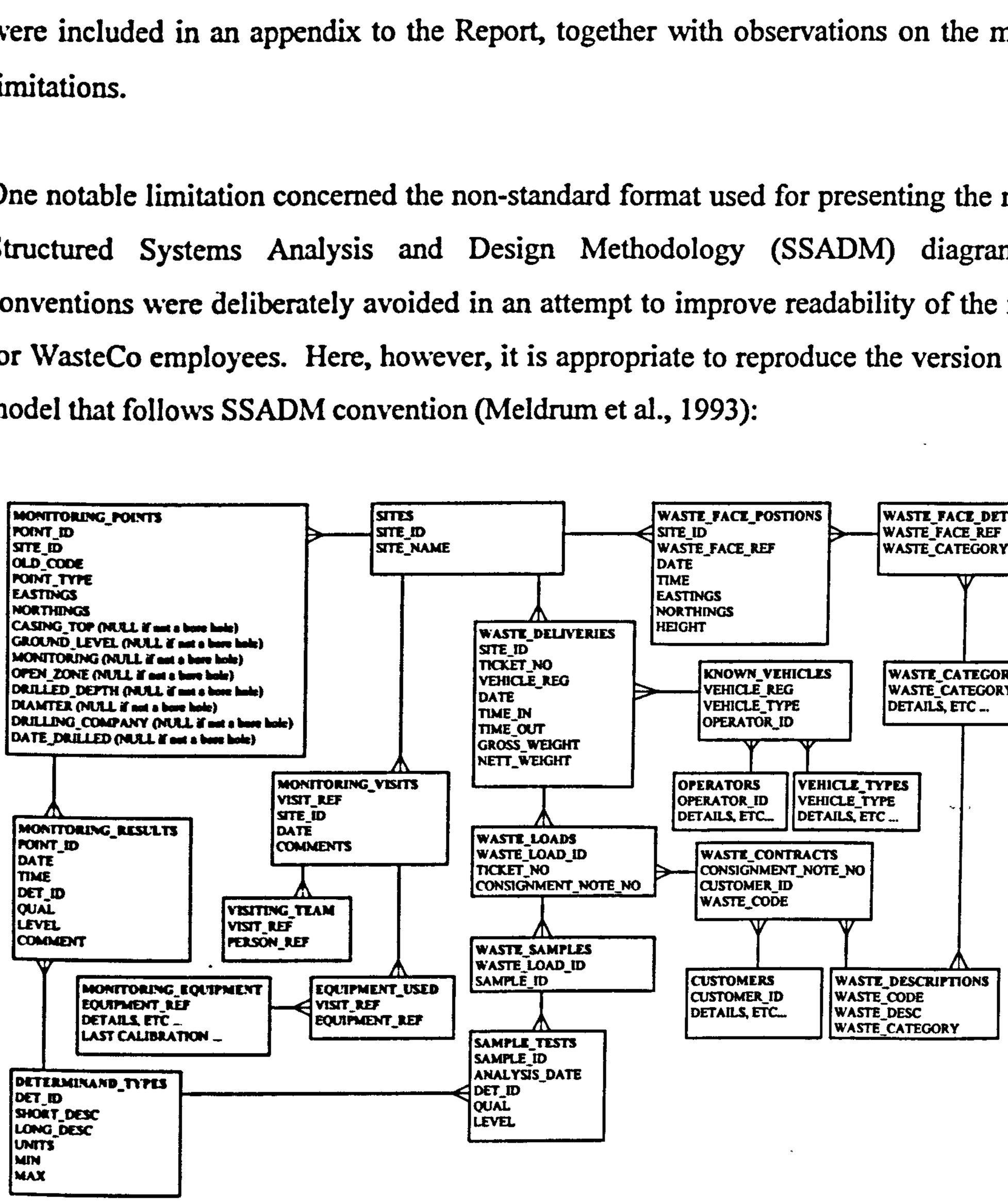


Figure 4-4 Proposed WasteCo environmental data model

Production of the model necessitated deep reflection upon the fieldwork. This process of reflection highlighted the problematic nature of the resolution at which environmental data needed to be collected and stored in order for them to be useful at different operational levels within WasteCo. The magnitude of this problem had not gone unnoticed by WasteCo employees:

> *"... different areas of the business need information at different levels of resolution:*
> - *'Sales' work with information about customers, invoices and descriptions of waste streams;*
> - *'Carriers' need to know vehicle load configurations, health and safety details and arrangements for transportation and unloading (ie how close to the waste face would their vehicles get ? what size and type of hose would a tanker need ?); whereas*
> - *the 'Treatment Plant' deals with waste on a drum-by-drum basis ...*
>
> *[Ms White] explained that integrating data about wastes which varied from the level of laboratory samples and particular drums, to vehicle deliveries and customer waste streams was 'basically a nightmare'* (Ms White, 22/08/95)

The data model included a proposal for linking waste samples taken for laboratory analysis, with customer contracts; the cross-referencing involved illustrates well the difficulties of analysing environmental data across different levels of resolution:

- A CUSTOMER can have several WASTE_CONTRACTS with WasteCo for disposing of waste streams to landfill; each WASTE_CONTRACT can be identified by a CONSIGNMENT_NOTE_NO.
- WASTE_CONTRACTS can involve many vehicles making at least one WASTE_DELIVERY
- Each WASTE_DELIVERY will be allocated a TICKET_NO as a vehicle passes through the weighbridge on entry to the landfill site.
- A WASTE_DELIVERY will usually contain a single WASTE_LOAD (However, some delivery vehicles can compartmentalise their cargo into several distinct loads).

- A number of WASTE_SAMPLES can be taken from any WASTE_LOAD; each is uniquely identified by a SAMPLE_ID
- Each sample can be tested for a range of DETERMINANDS with the results being returned from the laboratory against a particular SAMPLE_ID

In the context of WasteCo's drive to meet their espoused goal of being environment- and safety-conscious, it would not be unreasonable to refuse to accept wastes from customers who regularly mis-represented the nature of waste submitted for disposal. This would require the capability envisaged by WasteCo's Waste Input Monitoring Scientist:

> *"... to recognise patterns in inaccurate waste descriptions from customers - to recognise when they try to pull the wool over our eyes!"* (Mr Black, 08/08/95)

However, as the above table demonstrates, a review of analyses performed on wastes received from a particular customer requires significant cross-referencing. A relational database would dramatically improve the feasibility of such an undertaking; although, the results from any such analysis would only be as good as the comprehensiveness of the waste sampling regime on which it was based; after all:

> *"... in terms of waste composition what did each sample represent other than the particular section of the container on the lorry from which the sample was taken?"* (Mr Black, 08/08/95)

Given the diverse intended readership within WasteCo, this limitation upon any computerised attempt at environmental data integration was considered sufficiently important to highlight within the Report even though the IT Manager appeared well aware of the situation:

> *"When asked about the potential of assimilating data about wastes received and emissions produced to provide a better knowledge of landfill processes, [Mr Blue]*

explained that it 'all rested on confidence' in the accuracy and completeness of the data." (Mr Blue, 23/08/95)

4.7.2.1.4 INTERVIEW SUMMARIES

By including interview summaries it was hoped that the Report would draw attention to the diverse appreciations of the process of collecting and using environmental data at WasteCo so that an enhanced awareness of each other's positions could inform future decisions. On reflection, a workshop involving all those with an interest in environmental information could have achieved similar ends but this would have been difficult to arrange given the workloads of WasteCo employees. However, the use of focus groups in which stakeholders explore an environmental management issue together, has potential for thesis development. The technique will therefore be explored in the chapters that follow.

4.7.2.2 FOR ENVIRONMENTAL MANAGERS WITH INFORMATION PROBLEMS

The continual movement between literature and field which characterised the WasteCo exploratory study, set up a mutually informing dynamic that refined the research agenda developed in Chapter 2. Whilst this served to articulate research themes with greater clarity (see section 4.8), it provided little feedback on the resonance of those themes beyond the setting of WasteCo. A strategy of exposing the themes to scrutiny from other environmental managers was therefore considered prudent before embarking on a central study. Informal feedback on the research agenda was sought from corporate environmental managers in two of the UK's largest utilities (see Chapter 6); they confirmed the agenda as relevant and highlighted the critical importance of appreciating the organisational context in which environmental management efforts took place.

4.7.2.3 FOR ACADEMIC PEERS

An important objective of the exploratory study had been to gain familiarity with the research process. As section 4.5.2 highlighted, the adaptive nature of the exploratory study meant that it was difficult to receive feedback from more experienced researchers

prior to entering the field. Presenting progress to research assessors and peers therefore provided an important impetus for reflection, encouraging the experiences of WasteCo to be considered from a perspective not encompassed in the Report described earlier. Exposing work in progress to peer review thus became a valuable mechanism through which my emerging sense of audience contributed to thesis development. Further development of this mechanism will be described later.

4.7.2.4 FOR STUDENTS OF IT IN BUSINESS

Strauss and Corbin (1990) talk at length about the value of bringing theoretical sensitivity from a researcher's life experiences to a particular research project; however, they devote less attention to the possibilities for bringing insights from the project back to the researcher's life. This research was undertaken on a part-time basis by a senior lecturer in a UK university business school; there was therefore considerable scope for setting up a mutually-informing dynamic between the research project and my role as an academic (Day 1993). Indeed, setting up a mutually-informing dynamic between research and teaching is not only generally regarded as useful (Zuber-Skerrit 1992b); its significance was reinforced in this case by my university's decision to fund the project. Therefore, the question was not whether to set up such a dynamic; it was how best to exploit this dynamic given that it was grounded in my teaching commitments. These commitments dictated the audiences and the scope of dialogue that could inform thesis development; therefore, each was reviewed in order to identify those that appeared most congruent with the WasteCo research themes.

Careful reflection on the themes present in the WasteCo study suggested that useful contributions could be forthcoming from my final year undergraduate students who were investigating the impact of computer networks on organisations. An 'anonymised' case study was written and agreed with Professor Green at WasteCo which subsequently became the focus for a major piece of assessed work for the students. Both the reflection that had gone into producing the case study, and the students' attempts to interpret and to suggest solutions to the issues raised therein, contributed to my appreciation of the research agenda.

A recurrent theme to emerge from students' responses to the case study, was confusion with levels of analysis. Students consistently struggled to apply dominant ideas in the IS literature, designed to have meaning for the organisation as a whole, to the circumstances of a particular department, or to interactions between individuals in different departments. This "problem of inference" (Markus and Robey, 1988, p. 593) inspired reflection upon the appropriate unit of analysis for the central study and reinforced the importance of exercising care over issues of scale in the ideas of others. Indeed, this provided further evidence of how a deliberate attempt to engage a pertinent audience in dialogue can contribute towards thesis development.

4.8 REFLECTION ON THE EXPLORATORY STUDY

On reflection, the WasteCo exploratory study largely achieved the aims envisaged for it. Familiarity was gained with ethnographic technique, guided conversation, data triangulation and qualitative data analysis. The study also afforded rich insights into processes of collecting and organising environmental data as experienced by environmental management practitioners. These grounded insights brought clarity, depth and new emphasis to the research agenda developed in Chapter 2 (p. 46).

The challenge of developing holistic understanding or, in the language of the WasteCo actors, "*a feel for the big picture*", emerged as a particularly strong framework for organising the study's dominant themes. This is not to say that the initial conceptualisation of an environmental information problem lacked meaning; indeed, informants commented that "lots of data but little information" was highly resonant with their experiences at WasteCo. Rather, the exploratory study demonstrated that integrating environmental data to produce meaningful insights was more than just a technical puzzle that could be solved by applying the right IT.

Throughout the study, informants emphasised how "*environmental data had to be taken in context*". Evidence from the study concurred with literature reviewed earlier in that environmental data sets were recognised as inevitably-limited reflections of the diverse

nature of the processes at work. The data sets do not stand alone. They are inextricably linked with actors' mental models of pertinent processes that are drawn upon in the collection and interpretation of such data. Thus, for integration to be meaningful, individuals not only need to share environmental data; they also need to share their models of processes that give meaning to those data. Here, the WasteCo study lends support to calls within the environmental management literature to create opportunities to learn from diverse appreciations of complex situations (section 2.3.5). Ways in which this can be achieved will provide an important focus for the rest of the fieldwork.

The vague notion of 'the importance of relationships between perceptions, structures and actions' that appeared on the initial research agenda, has developed significantly through the exploratory study. Future fieldwork is now directed to examine notions of ownership and assumed boundaries of responsibility in organised attempts to create holistic environmental understanding.

4.8.1 METHODOLOGICAL DEVELOPMENT TO BE INCORPORATED IN SUBSEQUENT FIELDWORK

In addition to the enhanced awareness of *what* to study that emerged from this exploratory work, an enhanced awareness of *how* that study can be undertaken has also been gained. Overall, the framework developed in Chapter 3 provided clear guidance, drawing attention effectively to research opportunities and challenges. However, reflection upon the detail of the study revealed activities that could be refined or undertaken differently in subsequent fieldwork. Changes planned for the central study were as follows:

- to reflect upon the extent to which the research encounter strategy accommodates pertinent stakeholder perspectives as an on-going part of the research process, rather than as an end-of-study activity (section 4.5.1.1);
- to seek informant validation of cognitive maps as an on-going part of the research process (section 4.6.2);
- to investigate opportunities for focus groups as a mechanism for exploring diverse appreciations of complex environmental issues (section 4.7.2.1.4); and

- to develop strategies for exposing findings to pertinent audiences that create enhanced opportunities for feedback (sections 4.7.2.2 and 4.7.2.3).

4.9 SUMMARY

WasteCo provided a suitable setting for an exploratory study. It afforded rich insights into the process of collecting and interpreting environmental data and enabled familiarity with appropriate research techniques to be developed, particularly with guided conversation and data triangulation. The initial research agenda, taken from the literature survey in Chapter 2, evolved over the course of the study to emphasise ways of building holistic understanding, and the issue of environmental data integration became clearly-positioned in the socio-technical arena. An emerging sense of audience contributed significantly to the research process during the exploratory phase and subsequent fieldwork was thus entered into with an enhanced awareness of the important but subtle nature of the context in which environmental management is practised.

5. CENTRAL STUDY: BEDFORDSHIRE COUNTY COUNCIL

This chapter will explain how experience from the exploratory study led to the choice of a central setting to support thesis development: Bedfordshire County Council's attempts to integrate environmental data and expertise.

Protracted dialogue with a network of organisational actors working to develop an integrated approach for improving the quality of the local environment will then be discussed in terms of the four objectives outlined in Chapter 3. A critical incident, involving a multi-party funding bid to support integration on social and environmental issues, will highlight and structure the themes identified through contact with the organisation. The chapter will conclude by reflecting upon the insights gained and identifying contexts, beyond Bedfordshire County Council, where these insights are likely to have resonance.

5.1 VISION OF THE RESEARCH PROBLEM

Whilst the research agenda developed from the literature survey provided a useful starting point for the exploratory study, the agenda gained clarity and direction from experiences gained in the field. The challenge of developing holistic understanding emerged as an organising framework for the exploratory study's dominant themes. It was thus carried forward to provide direction for the cental study.

Attempts to operationalise the vision of developing holistic understanding were most visible in WasteCo's plans to integrate data from different sources. Indeed, data integration appeared to provide a practical realisation of the research problem that was resonant with the concerns of organisational actors. If the sense of audience developed in the WasteCo study was meaningful for other organisations, then exploring possibilities for data integration appeared an attractive way to describe research in this area. Furthermore, the exploratory study had showed data integration to be iceberg-like in character - initially appearing as a technical puzzle, in-depth investigation revealed its inherent complexity and located it firmly within the socio-technical arena (section 4.8). Thus, whilst the challenge of developing holistic understanding provided an appropriate

vision, or story, to guide a central study, integrating environmental data to produce meaningful insights was retained to provide practical focus, as it had in the exploratory study (section 4.3).

5.2 GETTING IN AND GETTING ON

The exploratory study demonstrated the value of **Table 3-4** for identifying research settings likely to contribute to thesis development. However, reflection upon the study had suggested a need for clarification regarding the appropriate unit of analysis for fieldwork (section 4.7.2.4). In following a strategy of 'snowballing', 'data triangulation' and 'theoretical sampling', it became clear that the exploratory study had adopted a network as its unit of analysis. More specifically, the network of actors who regarded themselves as part of the process of collecting and using environmental data at WasteCo. This network was pursued as far as WasteCo's organisational boundary. However, this did not make the organisation the unit of analysis. Indeed, reflection upon the research encounter strategy revealed limitations arising from focusing research activity within the organisational boundary (section 4.5.1.1). Such limitations are inevitable. That they are termed limitations is seen by some as an unfortunate manifestation of the modern search for pure order:

> "... I thought that I could describe everything that was of any importance. I was committed to a version of pure order - that I could order my account to mirror what was 'really going on' ... But at the time I didn't see this. And I didn't see that this was impossible." (Law, 1994, p. 46)

However, such limitations gain meaning and value when seen against the backdrop of theory development. Indeed, theory development must be similarly set against the backdrop of recognised limitations. Each informs understanding of the other in an iterative model of research. In this way, perceived limitations of the exploratory study helped to sharpen understanding of theory being developed.

The thesis being advanced here is designed for an audience who regard themselves as part of the process of dealing with complex issues in organisations. The emergent, transboundary nature of complex issues challenges the appropriateness of organisational boundaries for dealing with such issues (Hadfield and Cannibal, 1996). It would, therefore, not be unreasonable for research seeking to contribute to knowledge in this area to do the same. Shifting emphasis from "organisation" to "network" encourages environmental issues to be followed across organisational boundaries, providing scope to reflect upon the significance of those boundaries along the way. In other words:

> Networks of actors who orchestrate responses to environmental issues in concert with one another constitute an appropriate unit of analysis for this research, rather than organisations.

In adopting this focus upon a network of actors, the intention is not to trivialise the role organisational context plays in responses to environmental issues. Rather, consideration must now be given to the multitude of contexts that shape, and are shaped by, collective responses to environmental issues. Defining suitable networks is a challenge for researchers and for practitioners alike. It is a challenge to which the adaptive, participative model of research (introduced in Chapter 3) would appear well-suited. It is, in short, an appropriate challenge for a study central to the development of this thesis.

5.2.1 IDENTIFYING APPROPRIATE RESEARCH SETTINGS

Experience from the exploratory study, particularly the clarified interest in networks of actors seeking holistic understanding to guide their environmental management efforts, enabled criteria for selecting a suitable setting for the Central Study to be updated in line with the emerging emphasis of the research. The revised criteria are used below to describe how a suitable network was chosen.

5.2.1.1 A NETWORK OF ACTORS SEEKING HOLISTIC UNDERSTANDING TO GUIDE THEIR ENVIRONMENTAL MANAGEMENT ACTIVITIES

As the WasteCo fieldwork was drawing to a close, a member of Bedfordshire County Council's Planning Department with particular responsibility for IS (Mr Kingfisher), contacted Cranfield's IERC with a query regarding data integration and analysis. The query appeared promising: a local authority with strategic environmental responsibilities (Blowers, 1993), was looking to explore ways of integrating data to inform its decision-making. A telephone conversation with Mr Kingfisher, confirmed that the first criterion would likely be met - a working group was being established to look at ways in which environmental data could be integrated to inform strategic decision-making. Furthermore, members of the working group were keen for input to their deliberations from Cranfield's IERC. However, rather than simply seizing the opportunity straight away, each of the criteria that had informed selection of the WasteCo study was considered before taking things further.

5.2.1.2 ... CURRENTLY EXPERIENCING A SENSE OF CRISIS

Local government in the UK has undergone considerable change in recent years. These changes have reached deep into the lives of those who work there (Law, 1994; Lemon et al., 1992). Indeed, as Hackney and McBride (1995) observe:

> "Organisations within the UK public sector have, under 15 years of Conservative government, been subjected to rapid and traumatic change. ... In response to this massive sea-change, the organisations have become more business-like, adopting business strategies, formulating mission statements and strengthening marketing and customer-oriented functions. Concomitant with this has been a recognition of the inadequacy of the information available to the organisations ..." (p. 17)

In their analysis of "the crisis in local government", Burns et al. (1994) identify a

> "... profound shift in the way [UK local government] organises its activities and the way it relates to the public it serves. The changes of the 1980s and 1990s have

> catapulted local government from relative obscurity into a highly visible role at the centre of national political debates. ... Driven by pressures from consumers and citizens at local level, by a maelstrom of legislation emanating from Whitehall, and by new thinking within the political parties, local authorities are being forced to change as never before." (p. 3)

Burns and colleagues describe moves away from the "highly professionalised departments structured to mass-production services", that characterised local government from the 1950s to the 1970s. A picture is painted of growing criticism of bureaucracies in which "[f]or each service there emerged a defined department or division; an administrative hierarchy of control; a set of procedures designed to ensure uniformity of treatment; and groups of professionals or specialists to perform the tasks" (ibid, p. 21). Widespread dissatisfaction with the remoteness of centralised decision-making, lack of accountability and a blinkered 'we know best' attitude, created impetus for the major transforming dynamics of the 1980s: privatisation and competitive markets; managerial self-improvement; and democratised service provision (Burns et al., 1994). The authors develop these three dynamics to provide a framework for analysing the strategies and focus of continuing local government reform (Figure 5-1):

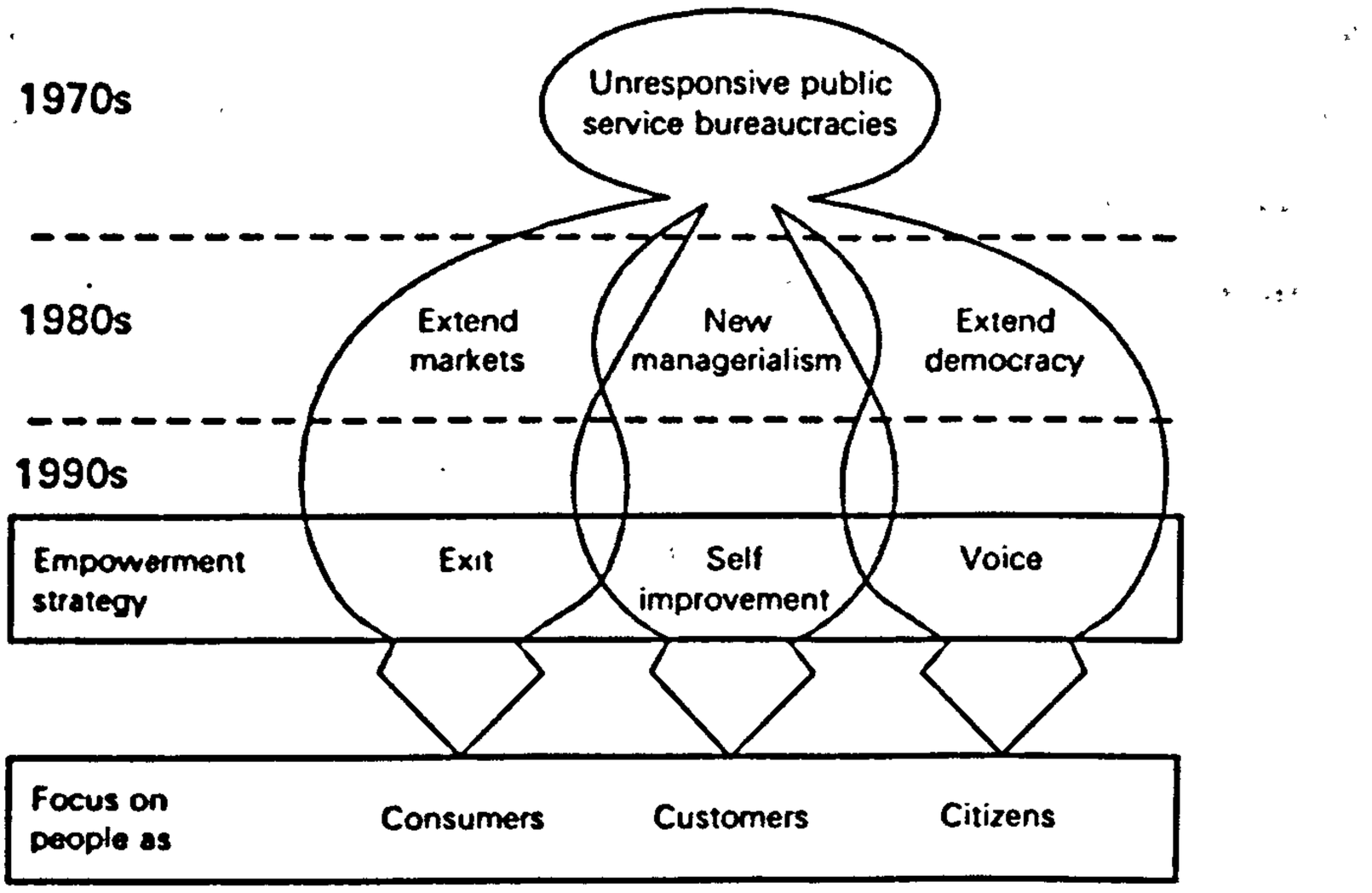


Figure 5-1 Public service reform strategies (Burns et al. 1994, p. 22)

This framework can be used to locate the work of others, eg Hackney and McBride's (1995) interest in the Exit empowerment strategy; Netherwood and Shayler's (1996) concern with strategies for Self-Improvement; and Lemon et al.'s (1992) concern with Voice. Whilst the framework offers a map of dynamics underlying the sense of crisis in local government, it does not do justice to the depth of change involved; as Burns et al. (1994) reveal:

> "Some councils are pursuing approaches to decentralisation which combine strategies for managerial self-improvement with the extension of voice for local citizens. For them the challenge is enormous. Not only are they rethinking their managerial values, form and structure, they are also striving to widen public involvement in the governing process. Such attempts to extend local democracy inevitably encounter more opposition than radical managerial changes because they offer a more fundamental challenge to the dominant culture of representative local government." (p. 27).

Indeed, Bedfordshire County Council had itself made a public declaration of its commitment to challenge the status quo, using the language of Self-Improvement:

> *"It can sometimes appear that a large publicly-funded organisation does what it does because 'it's always been like that'. In Bedfordshire all services are subjected to continuing and increasing customer appraisal as to their efficiency, effectiveness and quality and even whether they need to be provided at all."*
> (A Short Guide to Bedfordshire County Council, 1995)

Points are raised here that will be returned to later within the chapter, but this brief literature review strongly suggested that Bedford County Council fulfilled the sense of crisis criterion.

5.2.1.3 ... OFFERING RICH OPPORTUNITIES FOR INTERACTION BETWEEN RESEARCHER AND ORGANISATIONAL ACTORS

In contemplating the suitability of conducting research in a UK local authority, the prevalence of similarly-located studies strongly suggested that others had found value in conducting research there. (See, for instance, Burns et al., 1994; Goodey, 1974; Hackney and McBride, 1995; and the Journal of Environment and Planning). The open tone of the initial contact and Cranfield colleagues' previous dealings with the County Council, also suggested that the setting appeared likely to fulfil this criterion.

5.2.1.4 ... WITH THE POTENTIAL FOR CONTACT OVER AN EXTENDED PERIOD OF TIME

In our first conversation, Mr Kingfisher talked about on-going efforts to integrate data and expressed particular interest in the extended time-frame that a central PhD study would permit. On the strength of this unsolicited interest in a longitudinal study, this criterion was deemed to be fulfilled.

5.2.1.5 ... WITH READILY ACCESSIBLE TEXTS AND ARTEFACTS FROM WHICH 'SHARED KNOWLEDGE' CAN BE GLEANED

Although moves away from the bureaucratic structure of local government have been noted (Burns et al., 1994), an emphasis on documentation is still a dominant characteristic (Bromley and Coulson, 1991). Furthermore, Mr Kingfisher mentioned a number of IT systems during the brief telephone conversation, and Council publications described how:

> *"The 33 County Council's libraries and the Action Points are an excellent source of information about the work of the County Council. You can look at Committee agendas or find the name of your local County Councillor, for example ..."*
> (A Short Guide to Bedfordshire County Council, 1995)

This combination of factors suggested that access negotiations with the County Council would be worth pursuing.

5.2.2 NEGOTIATING ACCESS

In order to explore ways in which a mutually-beneficial research relationship could be developed, a meeting was arranged with Mr Kingfisher and members of the group working on data integration in the County Council. The meeting took place at County Hall, an imposing concrete structure on the edge of Bedford town centre.

Like Law's "access stories" (1994), the exploratory study had raised the importance of first impressions. Here too, first impressions raised some important avenues of inquiry. These will become clear as the chapter develops; however, the following account, which has been reconstructed from field notes made at the time, signposts some immediate concerns with organisational structure and responsiveness, and with my role as an environmental management researcher.

Sitting in one of the building's reception areas, having arrived in good time for the first meeting, I was afforded my first glimpse of some of the varied interactions going on within County Hall. In my brief period of observation I was struck by the number of slightly bemused citizens who approached the reception desk and started their queries with variations on "I hope you can help me; I'm not sure if I'm in the right place but ...". The receptionist appeared to listen carefully to each query and then either suggested that the person should pursue it with another agency - I think I heard mention of the Borough Council - in which case the person left the building; or a telephone call was made and within a few minutes a Council Officer emerged from the lifts opposite reception, introduced her/himself to the person and then found a quiet spot in the waiting area to discuss the query further. I was also aware that I was waiting with two groups of smartly-dressed salesmen; not rivals, but each group was planning its strategy for making its wares most appealing to the Council. I remember wondering if I had just seen the dynamics of the market and the citizen-responsiveness that Burns and his colleagues had described. As I caught sight of a second reception desk at the top of a particularly impressive flight of stairs and wondered if I was waiting in the right place, I also

remember feeling empathy with the bemused citizens who had been similarly unsure of how to negotiate the structure of the County Council.

I was relieved when the lift doors opened to reveal someone who introduced himself as Mr Kingfisher. He asked after my journey and appeared surprised at my likening the M6 motorway to a car-park. The brief trip in the lift did not allow time to determine whether his surprise was due to my 5am start or the contradictions the car journey exposed in my environmental credentials. Either way, I felt the need to explain that I was visiting Cranfield University later in the day - a place not well-served by public transport, particularly for someone living in Manchester ! What did this say about my PhD in environmental management ? In this simple exchange of pleasantries we had raised the concept of sustainable development and my actions had been found wanting. ...

The meeting was held in a spacious office, recently vacated by the County Planning Officer, which had impressive views over Bedford. It involved three senior managers from the Planning Department: Mr Kingfisher, Mr Falcon and Mr Hawk (see Figure 5-2). Mr Kingfisher opened the meeting by introducing a paper he had tabled, entitled "Some Notes on Data Integration and Analysis". Subsequent discussion confirmed the suitability of the data integration initiative as a focus for the central study. In particular, the following points were raised about the initiative:

- 'interactions' between people and the environment were a central concern;
- data sets pertaining to such interactions, or their outcomes, were many and varied;
- some data sets needed for a representative picture were held by bodies other than Bedfordshire County Council;
- 'significant movements' within the data were of particular interest; and
- information was required for both policy formulation and evaluation, and for educating the public.

Mr Falcon identified a dual rationale behind the data integration initiative: the major focus was on responding to formal environmental information requirements laid down in guidance produced by central government and bodies such as the Local Government Management Board (LGMB); however, there was also a secondary emphasis on exploring

available data to find new angles on trends and relationships. Whilst the meeting gave the impression that the motivation behind the initiative was generally well understood, it became clear that the detail of how it would be achieved was less certain. All three Planners pointed to ongoing restructuring within the County Council. They believed that an inevitable consequence of this restructuring was that ways in which the integration project could be developed would only become obvious over time. It was therefore agreed that my attendance at subsequent integration project meetings would be mutually-beneficial, and would provide scope for me to make contributions where appropriate. The nature of those contributions provided the focus for the second meeting which marked an important milestone in establishing the role of the researcher.

5.2.3 ESTABLISHING AND MAINTAINING AN APPROPRIATE ROLE FOR THE RESEARCHER

In the first meeting Mr Falcon had described how the Planning Department was about to engage in a "What Business Are We In ?" session. As this session had sought to explore areas in which staff felt vulnerable and uncertain, as well as to explore visions of a way forward, I did not seek to gain access to it. As Law (1994) would put it, I did not yet feel part of the tribe. However, after a respectful time had elapsed, I contacted Mr Kingfisher to see if there had been progress on the integration project. He explained that support was building for the project and he was keen for me to contribute, potentially on a paid consultancy basis. A second meeting was therefore arranged to clarify details of the project and to define my role within it.

Whilst the concept of combining research and paid consultancy work sounded appealing, the prospect of receiving payment for my involvement in the project raised questions about other actors' expectations of my contribution. If I were to receive payment would my involvement be kept to a minimum ? Would an obligation to provide value for money limit my opportunities to experiment with research technique ? In short, was there sufficient congruence between our agendas for payment to reinforce, rather than expose weaknesses in, the relationship ?

At this early stage of our relationship, these questions were extremely difficult to answer. Furthermore, little guidance was available from literature consulted about conducting social research (particularly, Easterby-Smith et al., 1991; Gilbert, 1993; and Hammersley and Atkinson, 1983). I knew from colleagues that it went on. "*Action-research is only consultancy by another name*" said one. *"Everyone does it, if they can"* said another. However, its absence from all the fieldwork accounts I had read suggested that it was something of a taboo subject. I therefore had to look elsewhere for guidance. It was here that I realised the value of articulating the principles on which my research strategy was grounded. I had argued for the importance of developing adaptive capacity to follow my emerging appreciation of the situation I was studying (Chapter 3). Payment that might reduce adaptive capacity ran contrary to that principle. I therefore decided that I would only seek reimbursement for travel expenses, and then, so as not to limit my interactions with those associated with the project, only for workshops in which I formally acted as facilitator.

I offered these terms of engagement in our second meeting and they were welcomed. Mr Falcon, in particular, described how *"the Planning Department was always glad to hear of worthwhile initiatives which required minimal investment, particularly in the present economic climate"* (Meeting 31/08/95). Clarification of my involvement centred around how I would interact, not when and with whom. My intentions to follow the network of actors involved in data integration were considered appropriate by all concerned and Mr Kingfisher offered to help me identify suitable individuals. I realised that my encounter strategy would be highly-dependent upon Mr Kingfisher acting in a "gatekeeper" capacity. In addition, experience from the exploratory study had highlighted the particular importance of the gatekeeper relationship in addressing problems of distance from the research setting (section 4.4.2). However, I felt confident that I could work with Mr Kingfisher and agreed to his proposal. As the meeting moved on to consider how the integration project might develop, it became clear that Mr Kingfisher had a central role in turning the vision of data integration into reality. I interpreted his actions as those of a project champion (Buchanan and Boddy, 1992) and felt my initial confidence in his capacity as a gatekeeper had been well-placed.

Throughout the exploratory study I had attempted to play a convincing role of an IT expert keen to learn about environmental management. For the central study I chose to follow Hammersley and Atkinson's (1983) suggestion to vary the roles I emphasised in order to gain different insights:

> "Different roles within a setting can be exploited, then, in order to get access to different kinds of data, as well as to acquire some sense of the various kinds of bias characteristic of each." (p. 97)

I chose to vary my strategies for managing 'personal front' so as to create "episodes" (Giddens, 1984), characterised by differing research emphases. These strategies were guided by my sense of audience. For example, I assumed that a university business school would be an institution respected sufficiently by local authority officers for them not to reject out-of-hand norms for running meetings proposed by one of its senior lecturers. This assumption shaped the approach I took to meetings in which I performed a facilitation function (see, for instance, section 5.3.2.1.1.) In such meetings, I hoped that my role as a senior lecturer would legitimate the structure of proceedings sufficiently for participants to concentrate on making contributions within the structure I had imposed. My aim was to draw a distinction between episodes where structures I had imposed were taken for granted and those where reflection upon the suitability of those structures was encouraged. I hoped to reinforce this distinction by emphasising my roles as a university lecturer and PhD student respectively.

In interviews where I sought a broad understanding of perspectives pertinent to the data integration project, or feedback on my attempts to contribute to the project in a facilitation capacity, I chose to stress my interests as a PhD student. I did not put myself forward as an expert. I emphasised that my desire for understanding was driven by an intention to make useful contributions where possible and appropriate.

In one-to-one interactions with Mr Kingfisher I deliberately chose not to emphasise particular aspects of my background at the expense of others. Here, the emphasis for establishing a relationship was on openness. I was a PhD student with little

understanding of the ways of Bedfordshire County Council. I had experience from my previous career in management consultancy and from my full-time occupation as a business-IS lecturer. I was interested in environmental management. I had ideas that I was prepared to share. I was equally interested in Mr Kingfisher's ideas and experience. I hoped that we could explore the issues together.

This approach contrasts sharply with some conceptualisations of research relationships (see, for instance, Susman and Evered's (1978) comparison of positivist science and action research). Like Law (1994) I did not seek to be a detached observer, for I could not. I hoped that, with Mr Kingfisher's help, I could become a "marginal native" (Freilich, 1970) in the data integration 'tribe'. In other words, my intention was not to create the perfect one-way mirror (Hammersley and Atkinson, 1983). I wanted to get in and to get on with the people involved in data integration and to learn from my interactions with them.

5.3 GATHERING DATA

The earlier exploratory study had demonstrated the value of a data gathering strategy based upon 'triangulation', 'snowballing' and 'theoretical sampling' and this experience had a strong influence upon the approach adopted for the central study. However, the central study differed from the exploratory study in that it was not constrained to a limited time period. Its temporal dimension therefore deserved careful consideration.

Calls for explicit consideration of the temporal dimensions to research are prevalent in the work of those who espouse process theories. For instance, Franz and Robey (1987) argue that:

> "Process modelling demands attention to the occurrence of events over time ... There is ... considerable objection to developing and testing process models with static research paradigms. ... Research that tests process models should be longitudinal and use analytical methods capable of increasing our understanding of the social dynamics involved ..." (p. 207)

Pettigrew (1992), a recognised advocate of process research for the study of strategy, suggests that:

> "... questions posed in the language of becoming rather than of being demand detailed, comparative and longitudinal data covering long periods of time. This may mean ... that strategy research has to tilt towards the orientation, craft skills and methods of the historian." (pp. 5-6).

However, he also observes that:

> "If strategy process research is to flourish, and there are many scholars now who wish that so, then we need to encourage more explicit thinking and writing about the analytical and conceptual assumptions that underpin processural research."
> (ibid., p.9)

Although it was my intention to maintain contact with those involved in the data integration project for a period of time, I was aware that there was more to longitudinal research than this. Throughout my initial reading of calls for longitudinal research I found it difficult to avoid asking the question: **How long would be enough ?** Indeed, I was not alone in posing this question:

> "In any longitudinal research, variable changes are believed to be linked to the passage of time, but researchers seldom have clear notions about how long a time is necessary for the effects to be seen." (Franz and Robey, 1987, p. 221)

However, in engaging this question out of context, I realised that I faced a similar trap to the question of how many interviews is enough. In responding to this question in the exploratory study I had returned to the philosophy and rationale of the research. With this in mind, the work of the process theorists was re-examined. Their aim of revealing social dynamics pertinent to the issue under investigation was evident. Methods for achieving

this aim were concerned with historical reconstruction of such dynamics, but assumptions about those best-placed to reconstruct pertinent dynamics were not consistent.

Some saw reconstructions based on the researcher's observations as particularly salient:

> "This [processural] understanding could not be obtained without conducting the research longitudinally by means of intensive continuous data collection."
> (Franz and Robey, 1987, p. 219)

> "Links between multiple levels of context can only be established by exposing actions and recurrent patterns in the processes under investigation over years and sometime decades. Time is captured in our work through a combination of retrospective and real time analysis. The longitudinal comparative case study method is our primary approach." (Pettigrew, 1992, p. 10)

Others took as their point of departure the assumption that a researcher performing intensive continuous data collection was necessarily best-placed to discern significant dynamics. For example, Lemon (1991) argues that modelling pathways of change is part of actors' every-day routine:

> "Individuals perceive process according to their evolving sense of place which is not only based on their own interaction with the social, built and natural environments but upon an awareness of spatial and temporal paths over which they have no direct involvement." (Lemon, 1991, p. 77)

More recently, a synthesis of these perspectives has been proposed. In other words, insights arising from a researcher's continuous observations should be blended with those gained from actors' historical reconstructions:

> "The methodological vehicle has been the in-depth case-study, where a combination of historical reconstruction and longitudinal analysis has been used to interpret events and actions over a period of a number of years." (Walsham, 1993, p. 247)

This synthesis is consistent with the philosophy guiding this research. Like Giddens (1984), it portrays all actors as skilled and knowledgeable:

> "That is to say, actors not only monitor continuously the flow of their activities and expect others to do the same for their own; they also routinely monitor aspects, social and physical, of the contexts in which they move." (ibid., p. 5)

In Pettigrew's terminology, everyone is a historian. However, this does not necessarily belittle the observational and interpretive skills of the researcher. Rather than fuelling debate over whether or not a researcher is better-placed to discern processes of change than those caught up within them, a new concern is established with blending insights effectively. In responding to this concern within the study, the concept of 'time frames' proved enlightening; in particular, it provided the foundations for contemplating an appropriate frequency and duration for first-hand observation.

Following Clark (1982), Little (1987) describes how 'time frames' offer a device for heightening sensitivity to variable rates of change in the key processes thought to be at work in an organisational setting:

> "Time frames consist of a distinctive orientation to past, present and future, embedded in practice." (Little, 1987, p. 170)

Like Hammersley and Atkinson (1983, pp. 46-49) and Lash and Urry (1994, pp. 223-251), Little draws attention to the social construction of time, describing how:

> "Clark sees the problematic nature of different 'sorts of time' as central to the construction of a theory of time as a socially-constructed device by which one set of events is used as a point of reference for understanding, anticipating and attempting to control other sets of events. ...
>
> ... [Time frames] may be entirely socially constructed as with government terms or fiscal periods, they may be largely imposed by a specific technology, through the

> cycles of its constituent processes or development periods, or they may be derived from seasonal or natural cycles as with agricultural and related activities. Time frames thus offer a linkage between macroeconomic, sectoral and case study material." (Little, 1987, p. 170)

Hammersley and Atkinson (1983) highlight the problematic nature of gathering first-hand data on all salient time-frames for a setting being studied:

> "It should be apparent ... that any attempt to represent the entire range of persons and events in the case under study will have to be based on an adequate coverage of the various temporal divisions. On the other hand, it is impossible to conduct fieldwork around the clock, and some degree of time sampling must be attempted." (p. 48)

They draw particular attention to time and resource constraints that inevitably influence the study of "larger-scale temporal dimensions, such as seasonal or annual cycles, and patterns of recruitment of new cohorts" (ibid, p. 49). Whilst these larger-scale time frames may be hard to study first-hand, consideration of their influence can be enlightening, as Little (1987) notes:

> "Time frame discrepancies can be considered as one form of unrecognised interdependence, the effects of which are often attributed to an aggregated uncertainty." (p. 173)

The setting for this central study is a UK local authority attempting to discharge its environmental responsibilities. For a part-time PhD student with a nominal five year registration period, this means that a number of salient time frames fall outside the temporal scope of first-hand observation. For instance, whilst central government policy may be a commonly-cited influence upon activity in local government (Burns et al., 1994), the cycle of general elections in the UK does not provide for adequate first-hand sampling within the available time frame. However, annual budgeting and accounting procedures in a local authority are more amenable to first-hand observation. As such annual routine is at the limits of first-hand observational capacity for this study, it was

adopted as a background time frame, against which it was hoped that the particular rhythms of the data integration project would appear in relief.

My aim for gathering data was, thus, to be 'in-tune' with the processes that constituted the data integration project. With the help of pertinent actors I hoped to spend at least a year following those processes over time and across space.

In clarifying the aim of the data-gathering strategy in this way, attention is drawn to the importance of blending insights gained from my first-hand involvement over a year, with actors' perceptions of salient processes, which, as Lemon (1991) discovered, can go well beyond the spatio-temporal boundaries that a researcher adopts for a study. The specifics of the data gathering-strategy that emerged to realise this aim are now described.

5.3.1 SELECTING RESEARCH ENCOUNTERS

As section 5.2 highlighted, identifying the network of actors who have interests in, or influence over, the data integration project, constituted a challenge not only for this research study, but also for those practitioners who had assumed responsibility for making the project succeed. Moreover, as proponents of actor-network theory such as Callon (1991) and Law (1992, 1994) argue, in articulating all salient actants shaping the data integration project, it was important not to underestimate the influence of material and technological artefacts. Even though the exploratory study had demonstrated that data integration was more than a technical puzzle, the opportunities and constraints that existing systems of data storage placed upon options for integration deserved exploration. Indeed, on the assumption that individuals orchestrate their responses to new technological initiatives in terms of their past experiences (Orlikowski and Gash, 1994), encouraging reflection upon the technological dimension to data integration was considered highly appropriate.

'Snowballing' provided an important mechanism for following the network of actors pertinent to the data integration project. In each research encounter efforts were made to determine other key actants. Where appropriate, each of these was followed up. Clearly,

without some selectivity such a strategy could go on forever, or at least until the period allocated for fieldwork came to a close. It was here, therefore, that an important concept from actor-network theory was introduced: 'punctualisation'.

> "... *if* a network acts as single block, then it disappears, to be replaced by the action itself and the seemingly simple author of that action. At the same time, the way in which the effect is generated is also effaced: for the time being it is neither visible nor relevant. So it is that something becomes much simpler ...
>
> Actor network theorists sometimes talk of such precarious simplificatory effects as punctualisations, and they certainly index an important feature of the networks of the social." (Law, 1992, p. 385, italics in original)

I was particularly interested in exploring the simplifications made by that those who had assumed responsibility for making the data integration project happen. Moreover, I was interested in exploring the adequacy of those simplifications with the actors themselves. My intention was thus to pursue the network sufficiently for fuelling dialogue about such simplifications.

Figure 5-2 provides a diagrammatic overview of the encounter strategy adopted for the Central Study. It illustrates clearly how a heterogenous network (Law, 1992 and 1994) was pursued across departmental and organisational boundaries. Texts and artefacts that were consulted appear as shadowed boxes; anonymity is preserved for informants, although their organisational roles are shown. An asterix appears next to informants who were consulted regularly during the study.

Texts shown at the bottom of the diagram represent 'punctualisations' identified by those involved in the data integration project or discerned within the materials they had put into circulation. Within the study these 'punctualisations' were assumed to stand for the stakeholders, such as the Department of the Environment (DoE) and the Local Government Management Board (LGMB), that had produced them. This allowed the adequacy of those assumptions to be explored with the actors involved in the data integration project.

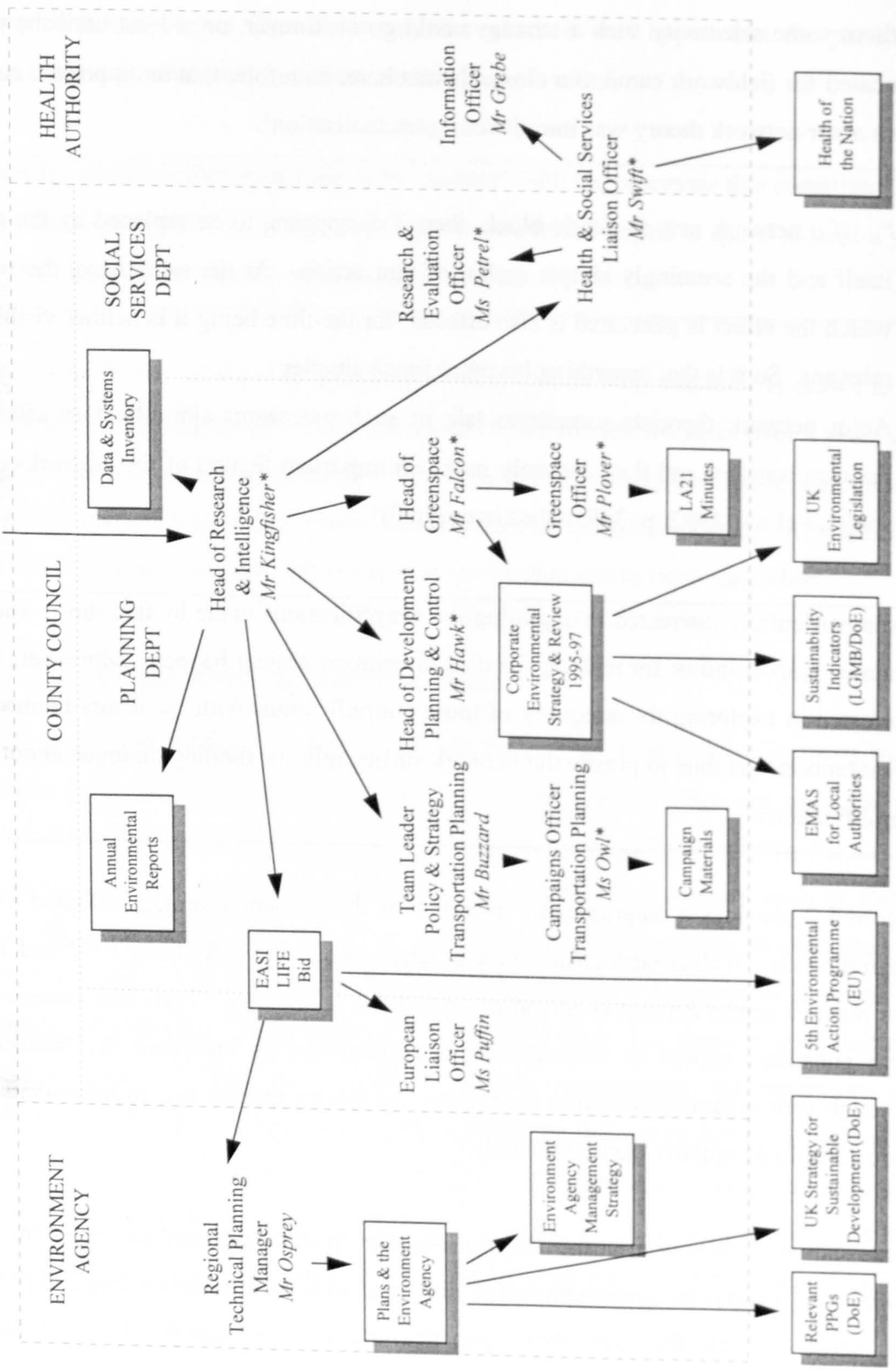


Figure 5-2 Network of encounters in the central study

As identifying pertinent actors and influences for the data integration project was seen as a challenge for both the study and the success of the project, it provided impetus for the process of data gathering. The following section describes the instruments used.

5.3.2 EMPLOYING APPROPRIATE RESEARCH INSTRUMENTS

The exploratory study had demonstrated the responsiveness of 'guided conversation' as a research instrument. It was therefore used as the main instrument for informant interviews in the central study. However, following reflection upon the exploratory study (section 4.8.1), interviews within the central study regularly involved multiple informants. These interviews adopted the character and style of 'focus groups' (after Merton and Kendall, 1946).

5.3.2.1 FOCUS GROUPS

In the participative tradition of this research, focus groups offered opportunities for the informants, and the researcher, to explore pertinent issues together. Their role within the study was thus resonant with Susman and Evered's observations on action-research:

> "The small face-to-face group is the primary medium through which the problem situation may be changed, as well as in which the interests and ethics of the various parties to the process may be developed ..." (1978, p. 588)

In contrast to McNaghten et al.'s (1995) use of focus groups, informants present at a particular meeting were not selected to be illustrative of actors within particular groupings, eg. either the Planners, or the Social Services staff. Instead, meetings tended to involve a mix of perspectives pertinent to the data integration project. For example, interested representatives might be present from both Planning and Social Services departments. Each meeting adopted the broad aim of articulating pathways along which the data integration project could or should develop, with the hope of identifying barriers and opportunities along the way. Whilst this provided valuable research data in itself, the processes of negotiation which ensued, surrounding who would be involved and how, meant that both the content and process of the meetings contributed to the study.

Building shared understanding of required commitment was a central concern for the data integration project, therefore interaction between actors with diverse interests was particular important. The exploratory study had indicated that the form of such interaction was central to the process of developing holistic understanding. Indeed, as Fielding (1993a) observes:

> "To the social scientists, the strength of group discussions is the insight they offer into the dynamic effects of interaction on expressed opinion ..." (p. 137)

Therefore, focus groups that set out to work with diversity, rather than reduce it, constituted an extremely appropriate instrument for supporting thesis development.

Within most of these meetings, my role was best described as an informal facilitator. My attempts to guide the conversation were largely kept to a minimum and were intended to facilitate exploration of each other's viewpoints, in much the same way as McNaghten et al. (1995) describe:

> "Focus groups are carefully mediated by a moderator, to be open, warm, and non-judgemental. The aim is that a group dynamic should be generated. The purpose of the moderator is to engender open and frank discussion, to encourage (neutrally) the articulation of all opinions, bringing out the variety of perspectives within the group. To achieve this, the moderator introduces issues and generally feeds the discussion, taking close attention not to present his or her own personal opinions." (p. 19)

However, my participation was higher than in McNaghten et al.'s account. Like their moderator, I introduced issues, but I did not seek to make my input insignificant. At times, I contributed to the dialogue, making it clear that such contributions were very much "*my own personal opinion*". Indeed, following Argyris (1993) and Senge's (1990) left-hand-columning technique, I tried to expose the assumptions on which each contribution was based, in order that they could be debated. In so doing, I hoped that others would be encouraged to do the same.

Meetings were recorded using the note-taking techniques developed in the exploratory study. After each meeting, a reconstructed record of events was returned to participants for comment and validation. My contributions to meetings were inevitably limited by my simultaneous need to take notes, but as these were not usually a major part of the meetings, this did not appear to be unduly problematic. Tape-recording interviews was considered but some informants expressed reluctance to reveal to a tape uncertainty about their role, and their department's role, during a period of organisational re-structuring. Although I attempted to clarify the purposes to which taped materials would be put, I did not try to force the issue for fear of limiting the insights that would be gathered. Some meetings were taped but this was the exception, rather than the rule.

My agenda for guiding conversation with informants focused upon exploring the challenge of developing holistic understanding. Informants were invited to articulate their perceptions of structures shaping their response to data integration and to highlight pertinent issues as they saw them. Following Lemon (1991), informants were encouraged to articulate processes that influenced their every-day interactions but ran well beyond the spatio-temporal scope of those interactions. However, whilst articulating informants' awareness of significant processes was important, the way actors dealt with that awareness, and the limitations they recognised in their response, was of central importance to their dealings with complexity. It thus provided impetus to my attempts to guide conversation in the central study.

For example, the idea of making deals with key stakeholders to gain access to data sets emerged as being important within the study; conversation was thus guided towards articulating this concept more fully. Following Fielding (1993a), stimuli in the form of "triads" were used to articulate attributes of data deals that were regarded as particularly pertinent. In other words, cards containing the names of major data-holding agencies were presented in threes and informants were encouraged to say which two were most alike and how they differed from the third. By repeating this exercise with cards containing the names of a number of data-holding agencies (identified in the session described next), a conceptualisation of data dealing was developed - see section 5.4.2.2.4.

5.3.2.1.1 BRAINSTORMING

After several initial focus group meetings it was decided that I should formally assume the role of facilitator for a "brainstorming" session that would involve stakeholders in the data integration project. Mr Kingfisher identified a list of twenty-five delegates, including representatives from various departments within the County Council, local Borough Councils, town and parish Councils, Local Agenda 21 Groups, Bedfordshire Health, Bedfordshire Emergency Services and the Environment Agency. Whilst the process of identifying contributors had been enlightening for all concerned, a pilot exercise was generally considered prudent before exposing the project to such wide and varied involvement.

Mr Kingfisher suggested that he, Mr Falcon, Mr Plover and Mr Swift could form an illustrative pilot, as *"they were all coming at the project from slightly different angles"*. (See Figure 5-2, p.142). Working with this perceptual diversity, rather than marginalising it, provided the impetus for the design of the pilot brainstorming session. After consideration of various approaches to brainstorming, including de Bono (1987) and Buzan (1989), Tudor Rickards' (1990) model of the creative process was adopted as a template for the session. This model was chosen as it portrayed a staged movement from a complex, often-tacit, web of interconnected problems - Ackoff's "mess" (1981), to convergence on a particular way forward. The process is characterised by periods of divergent and convergent activity, and Rickards (1990) suggests appropriate techniques to support each activity stage. For instance, if a group is struggling to contribute ideas for a particular problem, he suggests a range of lateral thinking techniques to "escape from personal stuckness".

Within literature on brainstorming and creativity, importance is placed on encouraging a group to suspend judgement so that a range of novel ideas can be elicited and explored (Buzan, 1989; Rickards, 1990). Indeed, Rickards suggests that:

> "The general principles of running a brainstorming are simple - encourage a team of people to postpone judgement, and see that all their ideas are collected and written up on flipcharts." (1990, p. 104)

In order to promote group behaviour in this way, materials given to participants emphasised the importance of avoiding "yes, but ..." - a phrase identified by Rickards (1990) as an archetypal "ideas killer". (Examples of these materials are shown in Figure 5-3). Also, within the sessions I made a deliberate attempt to reward postponement of judgement and drew attention to premature evaluation of ideas when it occurred. In Giddens' (1984) language of structuration (Figure 5-4, p. 154), I consciously shaped interaction along the dimensions of communication and sanction, in order to reconstitute structures of signification and legitimation, drawn upon within the group, so that they might be more amenable to brainstorming.

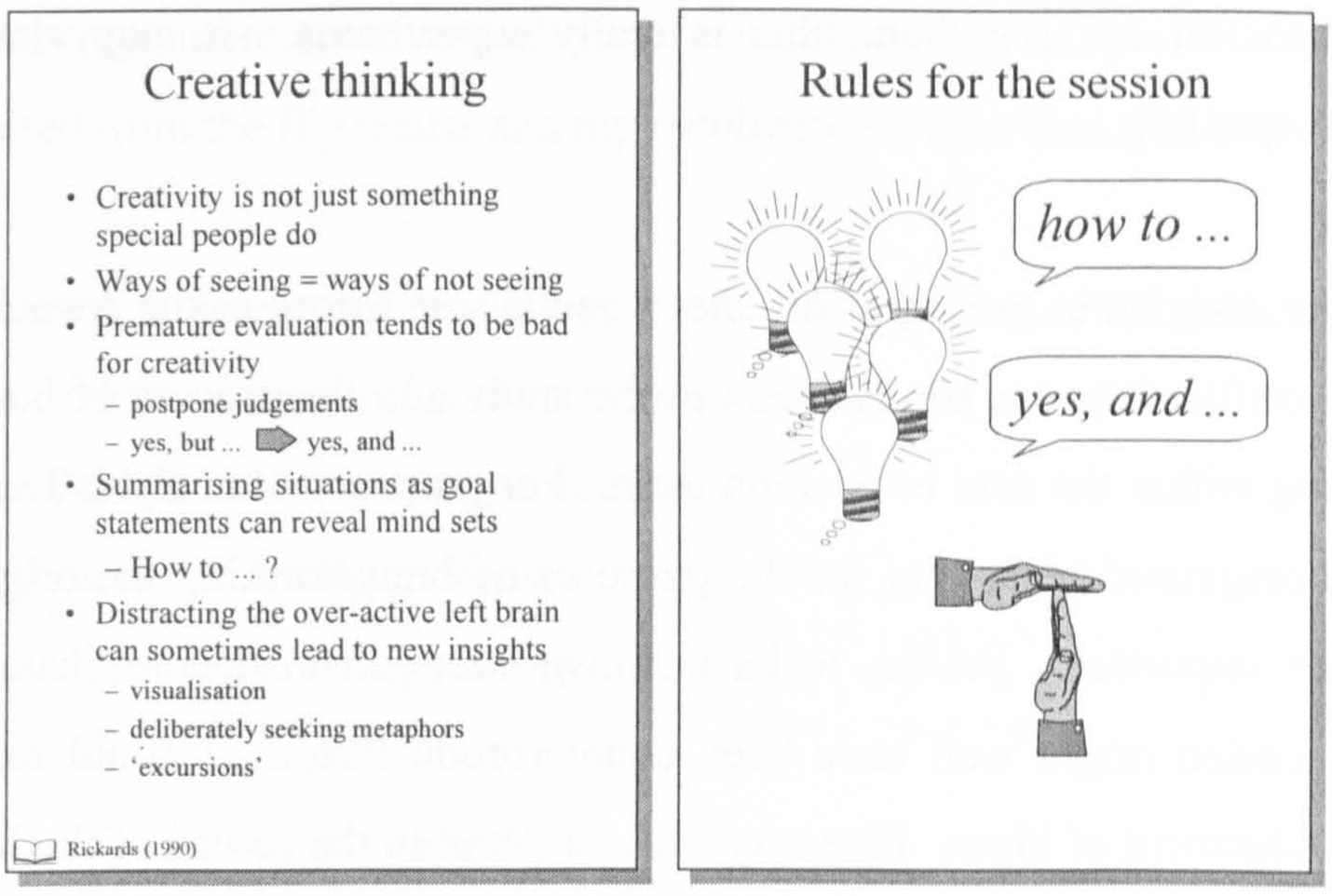


Figure 5-3 Examples of materials used to introduce brainstorming techniques

In order to facilitate the process of establishing group norms appropriate to brainstorming, I followed Rickards' (1990) advice of using a warm-up session "to set the atmosphere" (p. 108). Thus, instead of starting with identifying the problems of the data integration project, I opened the session by inviting participants to suggest uses to which an onion might be put. This irrelevant context for ideas generation allowed behaviour

inappropriate to brainstorming to be discouraged without my interventions being interpreted as a threat to participants' ideas for the data integration project. Furthermore, it helped to set a relaxed tone which continued later in the session when issues become more embedded and more personal.

Throughout the session, I endeavoured to record participants' contributions on flip-chart paper, taking care to confirm that what I had written captured the intended spirit of each contribution. When a piece of paper was filled, it was fixed to the wall so that the ideas upon it might continue to inform the session. In order to support the relaxed tone, I chose not to tape-record the proceedings. The session took place in a relatively small room where tape-recording would have been particularly obvious; I therefore judged, like Rickards (1990), that tape-recording could be inhibiting:

> "Some operators tape-record sessions, but since it is valuable to write up ideas at the time, where all can see them, this is really superfluous. It may also inhibit the session." (p. 104)

However, the decision to use flip-chart sheets as the sole record of the encounter revealed a potential conflict between the interests of the study and the process of building shared understanding within the data integration team. For purposes of analysis I was interested in who had originated ideas, but for the purposes of brainstorming the originator of the idea was not important. Indeed, to have drawn attention to the originator of an idea within the session might well have been counterproductive as it could have provoked premature judgement of ideas. However, lack of detail in the record of the brainstorming session was not considered to have compromised the study unduly because of the emphasis placed upon data triangulation. In other words, the brainstorming session was only one part of a data gathering strategy designed to achieve understanding of a complex whole.

Consideration of the data integration project within the session began with my invitation to participants to express their feelings about the aim of the project. They were then invited to identify particular problems they saw using goal-oriented "How to ..." problem-

statements - an approach favoured by Rickards (1990). One of these, "*How to define project scope*", was chosen for further exploration and several suggestions were made on how project scope could be defined. Fairly soon, it became clear that the group was getting stuck. Following Gordon (1961) and Rickards (1990), I invited suggestions for a metaphor for the problem at hand.

In situations where problems appear intractable, Gordon (1961) argues for the importance of "making the familiar strange" so that creative suggestions on a way forward can emerge. He describes the approach as Synectics, noting how:

> "Play with metaphor is one of the most fruitful of the mechanisms which can be used to make the familiar strange." (ibid, p. 31)

Thus, by inviting suggestions for a metaphor of the problem that could be explored, I hoped to encourage more creative analysis of the data integration project. The following is reconstructed from the flip charts and my recollection of the dialogue that ensued:

"[Facilitator] It seems we're getting stuck. Maybe we could get further with a metaphor of the problem. What does the problem remind you of ?
[Mr Plover] It's a bit like making a bubble
[Mr Kingfisher] ... Chasing a dream ?
[Mr Falcon] It reminds me of making a model kit
[Mr Swift] Yes, like a jigsaw
[Mr Plover] I guess it's like creating a work of art ..."
(Brainstorming session, 04/12/95)

On inviting the group to decide which of the metaphors to pursue, the metaphor of making a model kit or a jigsaw was chosen. This was subsequently pursued at length and reformulated as a more graphic image of a dysfunctional family attempting to complete a jigsaw at Christmas. This image led to a number of insights being revealed, including the notion of a number of "*key players who held important pieces*" and a "*broker*" who *"made deals to ensure that everyone kept playing"*. These insights contributed

significantly to the final exercise which attempted to develop a concise overview and rationale for the data integration project. Checkland's (1981) notion of formulating "root definitions" for "human activity systems" was used as a template for this exercise as its role in Soft Systems Methodology appeared congruent with the session's emphasis on problem exploration:

> "'Systems thinking' is a means of lifting the ideas of the analyst above the mundane; by temporarily disregarding tangible factors and considering the enterprise in abstract terms, new ideas will emerge about possible problems and changes that may overcome them. Whilst intellectually a separate endeavour, the exercise will nonetheless be influenced by the views and issues drawn out in the earlier stages, forming the basis for root definitions and associated conceptual models."
> (Patching, 1992, p. 3)

Root definitions can provide a concise, systemic project description (Patching, 1992), articulated in terms of purpose, means, and higher-goal. In other words, a system to do X, by means of Y, in order that Z (Checkland, 1981). If root definitions are then expanded in response to questions raised by the so-called CATWOE checklist (Checkland and Scholes, 1990), a host of important assumptions are explicated regarding:

- Customers - victims or beneficiaries of the Transformation
- Actors - who perform the Transformation
- Transformation - of input to output
- Worldview - under which the Transformation is meaningful
- Owners - who have the power to stop the Transformation
- Environmental constraints

Table 5-1 Checklist for root definitions (after Checkland and Scholes, 1990)

The brainstorming session thus closed by modifying the emerging root definition to reflect issues raised by the CATWOE checklist. Copies of the flip-charts produced during

the session can be found in the Appendix (section 13.2, p. 375). Reflection upon the outcomes and process of the session can be found in section 5.4.2.1.

Although reaction to the pilot brainstorming session was generally positive, plans to run a similar session for a wider group of stakeholders were overtaken by a dramatic change in the trajectory of the data integration project - section 5.3.2.2.1 provides the details.

5.3.2.2 INTERPRETING DOCUMENTS

In following the network of actors, texts, and artefacts involved in shaping the course of the data integration project, a number of texts were identified by informants as having a significant influence over their activities. In accordance with the principle of 'punctualisation' (section 5.3.1), such texts were interpreted as "standing for" the complex actor-networks that had produced them. For instance, the 1995 Environment Act was taken as a working simplification of the complex parliamentary procedures, consultation exercises and central government intent from which it had arisen. Texts such as this were integral to the strategy of data triangulation used in the study. Reading them aided the process of imputing meaning to informants' behaviour. It also provided avenues of inquiry to pursue in conversation with informants, particularly regarding the adequacy and stability of simplifications represented by the texts.

Giddens' model of the dimensions of the duality of structure (1984, p. 29) played an important role in interpreting relationships between informants' behaviour and the texts they identified as being of significant influence. This process of analysis is described further in section 5.4.2.3, however it is noted here in order to illustrate the mutually-informing dynamic between data gathering and data analysis that was maintained throughout the study. A novel use of this dynamic, consistent with the participative nature of this research, is also described in section 5.4.1.2.

In summary, on-going interpretation of texts, identified as having significant influence upon the data integration project, played an important role in the study's strategy of data triangulation. In particular, impetus was provided for reflective dialogue with informants

about the development of the data integration project and how it was being shaped. Whilst most texts were used in this way, the next section describes how one text was particularly significant in representing emerging understanding of the data integration project.

5.3.2.2.1 THE ENVIRONMENT AND SOCIAL INTEGRATION (EASI) LIFE BID

In a focus group in March 1995, the possibility of gaining European Funding to support the data integration project was raised. Securing funding through the European Union's LIFE initiative was considered most likely to succeed, although the deadline of late May for applications initially appeared unrealistic, particularly as partners from other member states would be required. However, this initial appraisal of the situation was reversed - section 5.4.2.1 considers why - and the data integration project took on a new urgency which the study was well-positioned to exploit.

Mr Kingfisher assumed responsibility for coordinating the bid and an intense period of activity followed during which the bid document emerged. Major drafts of the bid document were circulated for comments about the desirability and feasibility of the proposals it contained. External consultants and an officer with experience of EU funding (Ms Puffin, Figure 5-2), were engaged and a series of meetings took place to discuss the emerging bid. I attended a number of these and was provided with a copy of each new draft of the bid document and records from the consultation process when I could not be present.

The May deadline had effectively accelerated the process of exploring the practicalities of the data integration project and the prospect of at least £0.25M in external funding had increased the attractiveness of participation for those on the margins of the initial project working group. I was extremely fortunate to gain access to the detail of this accelerated and highly-visible dialogue, particularly as it provided a graphic illustration of how pertinent resources and stakeholders could be mobilised in response to a complex issue. Although the LIFE bid had not been anticipated at the outset of the study, responsiveness

inherent in the adaptive, participative research strategy had enabled the opportunity it presented to be exploited to the full.

5.4 GENERATING THEORY

The previous sections have described how processes of data gathering and data analysis were interwoven to create a mutually-informing dynamic. The following sections now describe efforts to facilitate the process of interpreting the fieldwork.

5.4.1 DEVELOPING THEORETICAL SENSITIVITY

5.4.1.1 LINKING CONTENT, CONTEXT AND PROCESS

A specific challenge facing management research in an environmental context is that of linking the content, context and process of initiatives (section 2.4). Addressing this challenge was central to providing a meaningful account of the data integration project network which constituted the focus of the fieldwork. Earlier, parallels were drawn between the IS and environmental management literatures and the potential, at least in IS, of Giddens' (1984) theory of structuration for interweaving content, context and process was highlighted (section 2.4.3). Specific contributions of Giddens' work to the process of interpreting findings from the central study are now considered.

Firstly, Giddens rejects the notion of a dualism between action and structure, proposing instead a duality of structure:

> "Structuration theory is based on the premise that this dualism has to be reconceptualised as a duality - the duality of structure." (1984, p. xxi)

Although (in his much quoted phrase) Giddens claims that he does not try "to yield a methodological scalpel", his work offers useful direction to the research process. Many find points of departure from his work - for instance, Law (1991b) and Walsham (1997) take issue with his emphasis on structure as memory traces instantiated only in social

practice. However, the conceptualisation of structure present in structuration theory is nonetheless helpful:

> "In structuration theory 'structure' is regarded as rules and resources recursively implicated in social reproduction." (ibid., xxxi)

> "Structure is not to be equated with constraint but it is always both constraining and enabling." (ibid., p.25)

Giddens develops these conceptualisations to facilitate reflection upon major dimensions of the duality of structure:

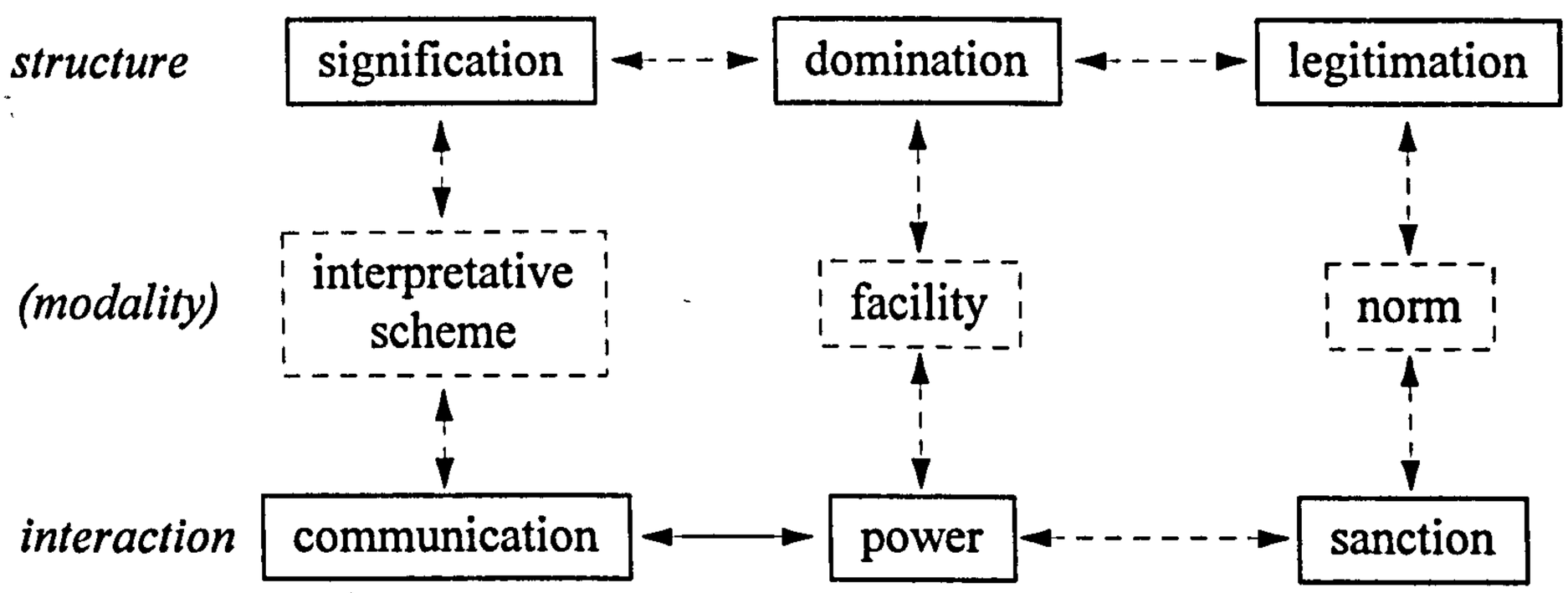


Figure 5-4 Dimensions of the duality of structure (Giddens, 1984, p. 29)

Whilst this model offers analytical insight into the processes through which social structures are produced and reproduced in every-day life, Giddens also signposts a mechanism through which particular structures become "stabilised":

> "Routinisation is vital to the psychological mechanisms whereby a sense of trust or ontological security is sustained in the daily activities of social life." (ibid, p. xxiii)

> "... the routines of daily life are the 'foundation' upon which institutional forms of societal organisation are built in time-space." (ibid., p. 36)

> "The routinisation of encounters is of major significance in binding the fleeting encounter to social reproduction and thus to the seeming 'fixity' of institutions." (ibid., p. 72)

This emphasis on routine and its importance in providing the ontological security of being able to take for granted the context in which one finds oneself, points to opportunities to interweave the content, context and process of the data integration project. As section 3.2 highlighted, Giddens' work has informed the research process at all stages, however an account of the specific application of these ideas to the interpretation of data gathered during the central study can be found in section 5.4.2.3.

5.4.1.2 LEARNING FROM CONTEXTS THAT APPEAR SIMILAR

Whilst focused literature surveys can contribute to theoretical sensitivity for interpreting specific issues encountered through fieldwork, the exploratory study demonstrated the value of learning from concepts and theories developed in contexts that appear similar. Following the participative approach adopted for this work, I took the unusual step of including Mr Kingfisher in the process of developing theoretical sensitivity from similar contexts. However, as an active participant in the data integration project, he was well-placed to discern similar contexts. Indeed, involving informants in this way not only enriches perceptual diversity drawn upon in the sense-making process (Strauss and Corbin, 1990), but it also affords opportunities to gain new access to the mental models key informants use to negotiate their every-day lives. In identifying ideas developed elsewhere that have sufficient resonance for making sense of their own experience, informants are apt to reveal something of that which makes their own experiences both similar to, and different from, the accounts of elsewhere. Although more commonly used in the early stages of data gathering, such comparison is a common feature of research techniques that seek to elicit constructs from informants (Fielding, 1993a).

Whilst this participative approach to analysis may appear somewhat unorthodox, it recognises, and attempts to utilise, what Giddens describes as the 'double hermeneutic' of social research:

> "... This is a mutual interpretative interplay between social science and those whose activities compose its subject matter - a 'double hermeneutic'. The theories and findings of the social sciences cannot be kept wholly separate from the universe of meaning and action which they are about. But, for their part, lay actors are social theorists, whose theories help to constitute the activities and institutions that are the object of study of specialised observers or social scientists. There is no clear dividing line between informed sociological reflection carried on by lay actors and similar endeavours on the part of specialists. I do not want to deny that there *are* dividing lines, but they are inevitably fuzzy, and social scientists have no absolute monopoly either upon innovative theories or upon empirical investigations of what they study." (1984, p. xxxiii, italics in original)

In following this approach, reflexivity is paramount. In other words, both researcher and informants must reflect upon pathways that are enabled and constrained through their interaction. During the central study, I introduced Mr Kingfisher to a number of research papers describing environmental management initiatives that I considered to be similar in either context, content or process to the data integration project (Table 5-2). These papers informed dialogue intended to sharpen our understanding of the data integration project. In subsequent meetings with other informants, I became aware that the language of some of those papers had entered the wider debate surrounding the project. Indeed, reflection upon the emerging vocabulary of the data integration project afforded important insights on the trajectory of the initiative as a whole. However, the papers contributed more than just some new terminology to the data integration project: Carlos de Pablo of the Departmento de Ecología, Universidad Complutense was subsequently invited to become an European partner in the LIFE bid. Reflection upon this unanticipated consequence of my approach can be found later, in Chapter 10.

de Pablo et al. (1994)	*Design of an Information Systems for Environmental Planning and Management*
Bell (1995)	*The Wyong Experience: An Integrated Strategic Approach to Environmental Management*

Water Bulletin 690 (16/02/96, p. 6)	*Raw Data to be Refined "£2.1M World Bank Project to help Turkey get to grips with its environmental data ..."*
Selin & Chavez (1995)	*Developing a Collaborative Model for Environmental Planning and Management*
Born & Sonzogni (1995)	*Integrated Environmental Management: Strengthening the Conceptualisation*

Table 5-2 Papers introduced for participative analysis

In conversation with Mr Kingfisher, "networking" was identified as a dominant theme within the papers that was particularly resonant with the experiences of the data integration project. Although language differed across the papers, we identified a common concern with interacting across organisational boundaries in order to identify, and secure participation from, those well-positioned to contribute to particular environmental initiatives. This working conceptualisation of "networking" can be usefully compared with that offered by Nohria (1992):

> "Individuals are alerted to the importance of their so-called 'connections' in getting things done or moving ahead in life and are therefore encouraged to network more - to build relationships that they can use to their advantage." (p. 1)

This concept of networking contributed significantly to theoretical sensitivity employed in interpreting the fieldwork (see section 5.4.2.2.4).

5.4.2 ANALYSING DATA

5.4.2.1 THE EASI LIFE BID SUBMISSION

Systematic coding techniques developed in the exploratory study provided an important basis for analysing the data integration project. However, rather than producing a thematic map at the end of the research, as had been the case for WasteCo, a map was produced shortly after the LIFE bid was submitted.

The timing of this was designed to encourage reflection upon the intense period of activity that had just passed. The £420,000 LIFE bid had required support to be secured across a range of departments within the County Council, and beyond, including partners from other member states. It had to be fully costed and appear both feasible and desirable. The bid document therefore represented the project team's understanding of the data integration initiative as they wished others to see it. In much the same way as the actor-network theorists' metaphor for computer software, the bid document represented "frozen organisational discourse" (Walsham, 1997). The aim of the systematic coding exercise was thus to expose my understanding of the processes that had become frozen, to scrutiny by the actors involved. In so doing, I hoped to appreciate both the content of the bid and the interweaving of processes and contexts that had produced it.

As with the exploratory study (see section 4.6.2), a central storyline was chosen to guide the systematic coding exercise. For this central study, the organising story concerned *how a group of actors transformed Bedfordshire County Council's espoused strategic commitment to improve quality of life within environmental capacity, into an innovative bid for external funding.* The thematic map generated by the systematic coding exercise is reproduced below. The map emphasises four dominant strands in the story of transformation that were revealed by the systematic coding exercise.

- the notion of an integrated data forum that would support meaningful exploration of environmental information by decision-makers across the region;
- plans to arrange workshops focusing on complex issues in which 'experts' would share their understanding of the processes at work and be informed by a range of data and integration tools;
- plans to establish a network in which 'data deals' would be 'brokered' with appropriate internal and external 'gatekeepers'; and
- a desire to develop a practical approach for integrating environmental data from diverse sources.

These four strands all appeared against a background of uncertainty about how the County Council would be structured in the future. Indeed, uncertainty amongst actors regarding their roles (if any) in the "*new*" County Council was a particularly strong theme:

> *"We're not sure what the departments will look like in a year-and-a-half's time"*
> (Mr Falcon, 31/08/95)

> *"There was general agreement that uncertainty surrounding the organisation structure that would result from the local government review exercise made options for project ownerships and control far from clear at this stage."*
> (Interview with Mr Kingfisher, Mr Falcon, Mr Plover, Mr Swift and Ms. Petrel)

This uncertainty led to some revealing insights as actors skilfully constructed the data integration project in terms that they believed would endure the process of reorganisation:

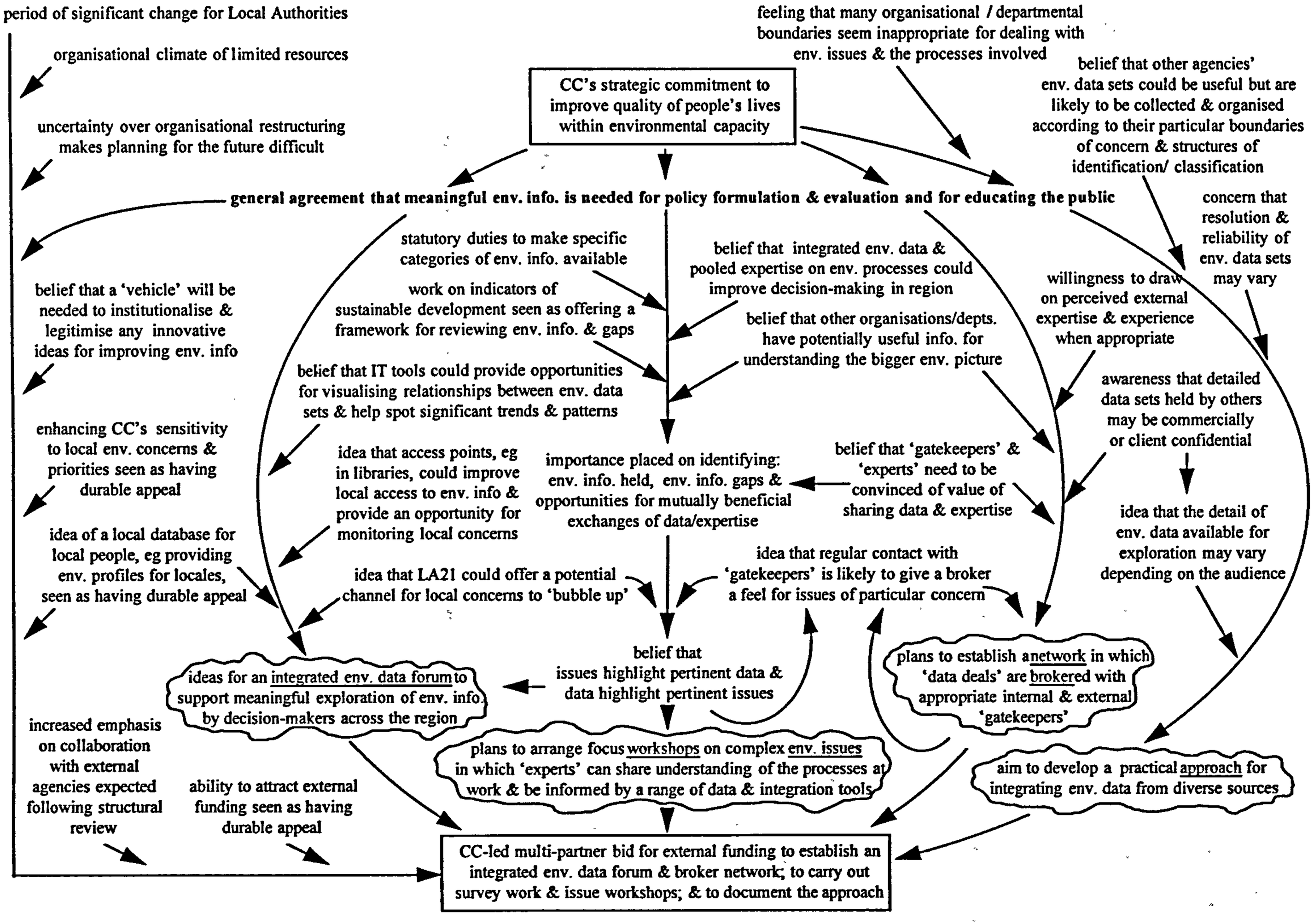
> *"[Mr Kingfisher] explained ... that he felt that the idea of a 'local database for local people' would have sufficient 'appeal' to 'maintain support throughout the period of change.'"*
> (Interview with Mr Kingfisher, 31/08/95)

Indeed, this context of uncertainty provides an explanation for the project team's decision to overturn their original assessment that there was insufficient time to put a LIFE bid together. The LIFE bid presented an opportunity to demonstrate willingness to pursue external funding and to collaborate with external agencies on a "worthwhile" project. Although the timescale (of a little over a month) was recognised as extremely tight by all concerned, the team had more to gain than lose by submitting a bid. Indeed, the tight deadline could be interpreted as something of an advantage. In meeting it, the team would have demonstrated commitment and determination, and it offered an excuse if the bid were to be unsuccessful.

The thematic map attempts to provide a graphic account of all these ideas, and the interconnections between them, on a single page. It represents the story, as I saw it, of

how the EASI LIFE bid emerged from the County Council's strategic environmental commitment. The four dominant idea strands, and the background of uncertainty about organisational structure and priorities, appear on the map as large arrows, moving from top to bottom. Smaller arrows are used to represent the contribution that actors' beliefs and ideas seemed to make to the development of these major themes.

Figure 5-5 Thematic map for the data integration project



5.4.2.2 POST BID SUBMISSION

The thematic map provided an opportunity to validate my understanding of actors' ideas, priorities and beliefs as they had become "frozen" in the EASI LIFE bid document - this process of validation is considered in section 5.4.3. However, the map did not mark the end of the central study. Whilst submission of the bid document had clearly formed an important milestone in the development of the data integration project, key actors were keen to ensure aspects of the integration project were at least piloted, regardless of the success of the bid (which would not be known for six months). The project team decided that preparing to hold some "*complex issue workshops*" would be a valuable learning experience for all concerned. Preparations involved a number of meetings - to which I was invited - and the collation of articles relevant to two particular complex issues:

- fuel-poverty; and
- air quality.

The process of selecting a focal issue, and the subsequent search for relevant expertise, data, and literature, provided the central study with a rich source of insights on the complex nature of integrated environmental management. Grounded analysis of research data gathered post- and pre-bid submission, informed construction of the following conceptualisation of the challenge of developing an integrated response (Figure 5-6):

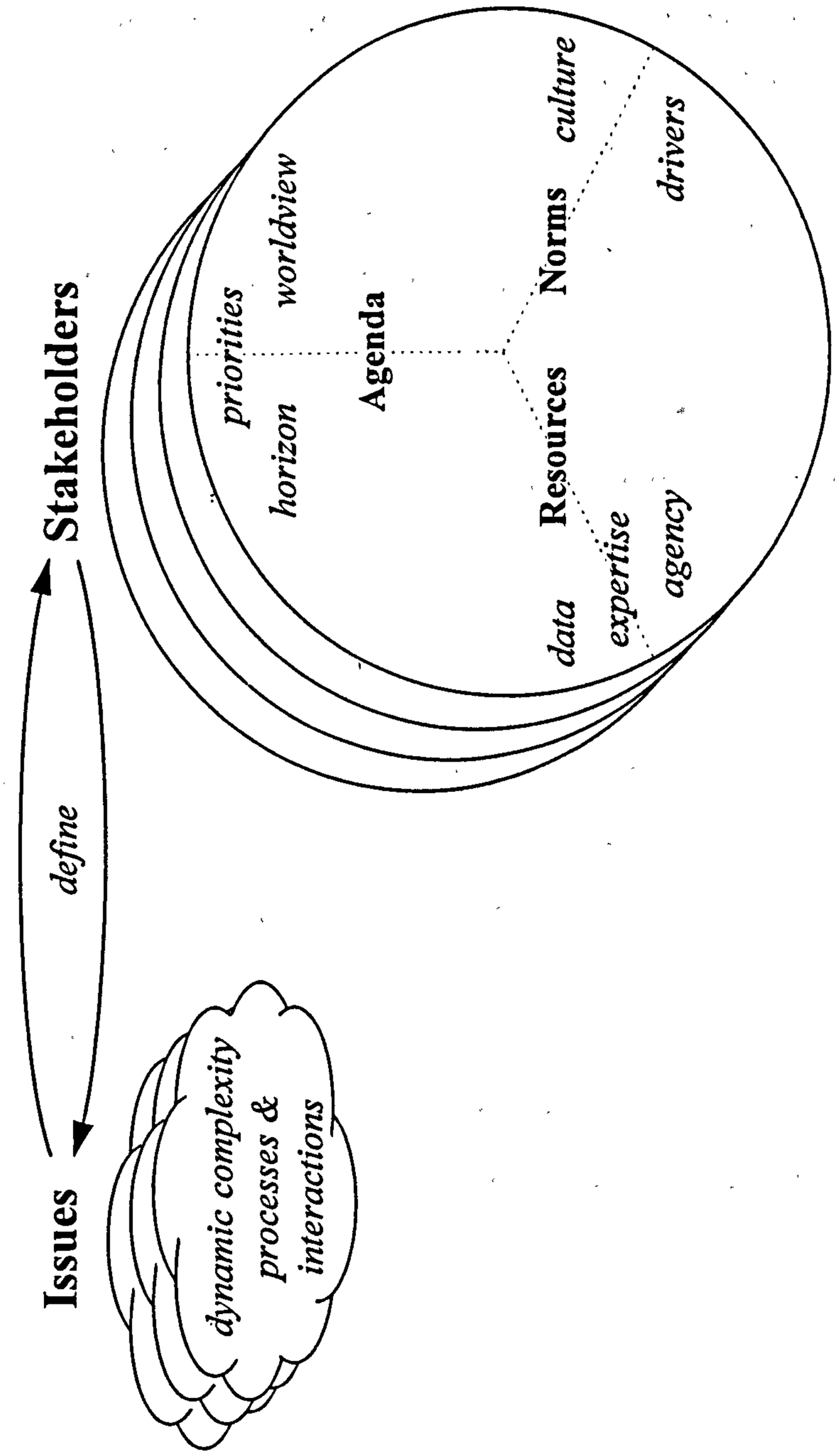
Conceptualisation	Key attributes of the problem-space	Promising attributes for a solution-space
	*politics of choosing a desirable & feasible issue*	*useful resources not always volunteered*
	widely-espoused rhetoric of collaboration	*networking (engaging the gatekeepers)*
	disparate data sets: varied purpose, classifications, resolution & coverage	*data rarely stand alone*
	precarious nature of working classifications/ simplifications	*group learning*
	a sense of audience	

Figure 5-6 A conceptual model of the challenge of developing an integrated response to environmental issues

Like any model, Figure 5-6 represents a simplified view of the richness being modelled; however it seeks to draw attention to aspects of the research situation that grounded analysis revealed as being particularly pertinent to the challenge of developing an integrated response to environmental issues. The two key constituents of the conceptualisation are stakeholders and issues. The model highlights a mutually-defining relationship between the two, and identifies salient attributes of each. The diagram also draws attention to attributes of the problem-space that the model (re)produces, and to promising attributes of an associated solution-space. Major elements of the diagram are now explored.

5.4.2.2.1 STAKEHOLDERS

Grounded analysis of research data confirmed that the concept of stakeholders provided actors with a meaningful device for categorising variety in the ways of thinking and doing of those concerned by, and/or influencing, the quality of Bedfordshire's environment. Whilst the term stakeholder features regularly in conceptualisations of integrated environmental management (see, for instance, Born and Sonzogni, 1995, or McLain and Lee, 1996), in-depth analysis of research data from the central study enabled eight interlinked features of actors' working conceptualisation of stakeholders, to be revealed:

- horizon (of interest);
- priorities;
- worldview;
- culture;
- drivers (behavioural influences);
- agency (capacity to act & influence);
- expertise; and
- data.

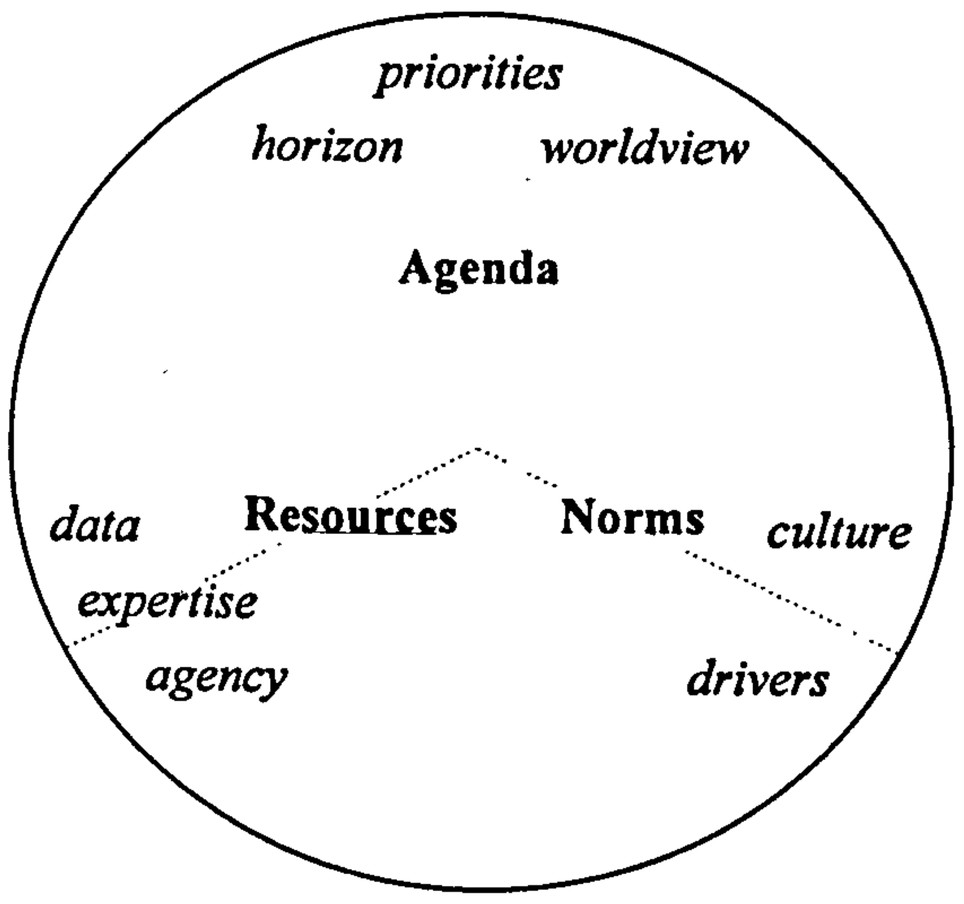


Table 5-3 Grounded conceptualisation of a stakeholder

These key features have been positioned in terms of Giddens' three dimensions for considering processes of structuration (see section 5.4.1.1). In the spirit of the grounded approach, the terminology of these dimensions has been modified to reflect more closely the language of the Bedfordshire actors. The mapping to Giddens' (1984) work is thus:

- 'agenda' resonates with the dimension linking structures of signification with acts of communication;
- 'resources' resonates with the dimension linking structures of domination with acts of power; and
- 'norms' resonates with the dimension linking structures of legitimation with acts of sanction.

In using the notion of a stakeholder to classify variety in the interplay between the actions of pertinent individuals and their associated perceptions of social structures, the intention is not to suggest that the classification constitutes a static model of reality. Rather, the emphasis lies in explicating a device for constructing precarious, but nonetheless helpful, simplifications of pertinent social networks. Stakeholder classifications developed in this way can thus be compared with Law's (1992) "punctualisations", Zuboff's (1988) "constellations of commonly-felt meaning", and Downs and Stea's (1977) "common skeleton provided by similar cognitive capabilities and shared activity patterns". This grounded application of Giddens' ideas inevitably raises the importance of routine in maintaining apparently stable and usefully-differentiated social networks. Thus, the eight elements that constitute the grounded articulation of the stakeholder concept, draw attention to salient aspects of routine amidst a baffling richness of goings-on. In so doing, they provide the basis of a sense of audience to those who have assumed responsibility for developing an integrated response. In short, the stakeholder conceptualisation developed here is a device for categorising significant variety in those individuals considered pertinent to an environmental project. This differs from the way 'stakeholder' is used elsewhere in the environmental management literature to highlight a static list, or a set of 'usual suspects' in a diverse audience.

5.4.2.2.2 ISSUES

Within the model developed in the central study, the key attributes of environmental issues are their characteristic dynamic complexity and their inextricable, mutually-defining relationship with conceptualisations of stakeholders. Therefore, its conceptualisation of environmental issues follows Lemon and Longhurst (1996) in emphasising the socially-constructed nature of environmental issues, rather than regarding them as scientific givens:

> "The scientific community is a key player, it is not an objective assessor operating from outside, determining what are issues and how they can be dealt with. Environmental issues, therefore, emerge out of, and give rise to, decision-making in dynamic, uncertain and complex situations which are poorly understood and inherently difficult to understand." (p. 614)

Throughout the central study, actors seemed well aware that the issues they faced were dynamically complex and thus unlikely to be rendered meaningful by reductionist inquiry:

> *"[Mr Buzzard]: ... there don't appear to be very good historical records on which to draw to actually explore any of these issues. ... [O]ne of the Districts did some OP-SYS [air quality] monitoring in the centre of Dunstable, and we knew about it because it was after we'd made contact with the EHOs, so we did some travel monitoring at the same time and that gave us co-incident data at very fine time intervals for a wide range of pollutants. We've got no idea of what confidence levels to put on the OP-SYS monitoring but there appears to be a problem with it - when you start moving flower beds around and things like that !*
>
> *[Researcher]: Hanging baskets wasn't it ?*
>
> *[Mr Buzzard]: Sorry, hanging baskets in Dunstable cause problems apparently ! So we're one part of the equation and we've got no view on how reliable the other information is; but, when we tried lining it up with the traffic data for the same days and same locations, it became immediately apparent that correlation there was not!*

So any simple attempt at trying to link travel quantities with air pollutant observations is fraught. ... our process of trying to link air quality monitoring at certain stations with fairly simple statements about the amount of travel fell apart because you can't easily take account of the meteorological effects because you don't know what they are !"

(Interview with Mr Buzzard, 06/09/96)

Notions of process were also an endemic feature of debate about environmental issues within the field. Indeed, process appeared to be a fundamental epistemological device that actors used to link pertinent phenomena across space and over time, eg:

*"If you end up with an asthma attack then it isn't easy to trace that back. I mean lots of people are doing work on it, ... blaming it on your personal exposure to traffic pollution levels ... OK fine that's one of the causal factors along with loads of others, but before we can decide how much of a beast travel behaviour is in this **process**, we need a bit more idea about this personal exposure ... you need all the environmental information, you need all the lifestyle information and other bits and pieces ..."*

(Mr Buzzard, Transport Strategist, 06/09/96)

Working conceptualisations of environmental issues held by actors within the central study were characterised by perceptions of complex interactions between processes - as in the quotes above and in the mutual causality acknowledged below:

"... the model you end up with is assuming that all these people are sat at home being exposed to other people's travel. ... you know, there's somebody causing the problem and there's this bunch of victims and they're two sets of people; whereas, in reality it's the same set of people - it's the people doing the travelling that are being exposed to other people's travel pollutants ..."

(Mr Buzzard, Transport Strategist, 06/09/96)

However, conceptualisations of process were not limited to socio-ecological processes "out there"; the term was frequently used to describe organisational and management responses to the issues, which were often considered problematic in themselves:

> *"... our view is that we ought to be part of the **process** of air quality management. ... That I don't think is a particular outstanding conclusion and it's been reached all over the place, although the **process** is, of course, going to be fraught in that, as yet, there is no experience of partnerships between environmental health departments at a District level and planning/highways/transport - whatever the arrangement happens to be at County-level departments ..."*
> (Mr Buzzard, Transport Strategist, 06/09/96)

This conceptualisation of a mutually-defining, dynamic relationship between stakeholders and issues was developed from and reflected in the problems that the data integration project team were experiencing on the ground.

5.4.2.2.3 KEY ATTRIBUTES OF THE PROBLEM-SPACE

With multiple issues and multiple stakeholders, choosing a focal issue that is generally-regarded as desirable and feasible by those who need to deal with it, inevitably created problems for the data integration team. Their response was to adopt a risk-reduction approach:

> *"... [Mr Falcon] explained that he felt that 'the idea of data integration's so big' that it was important to gain experience of the principles and techniques for analysing an issue through a pilot study before involving a wider group of stakeholders. He pointed out that it would be 'nice to select a relevant issue for the pilot' but he felt that the choice of a pilot issue should be made on the basis of opportunities for learning about the process of analysis, rather than being 'unduly constrained by politics (with a small 'p')'. [Ms Petrel] added that in order to maintain support for the project, the pilot should be generally regarded as feasible. ... the pilot issue should be chosen on the basis of a general feeling that 'something could be done about it' ... "*

(Group interview, 15/03/96)

However, in considering which issue to focus upon, it became clear that congruence between perceived stakeholder interests was also an important factor:

"The researcher asked which environmental issue citizens would choose for such a workshop and traffic-related air quality was a unanimous response. ... the meeting agreed that working with this problem would yield important lessons from the pilot. ... [Mr Plover] noted that traffic-related air quality was a topical and emotive topic. He compared the Department of Transport's line on the issue with the direct link between traffic and health which Councillors saw when they heard about increasing incidents of residents in their wards suffering from asthma. He further noted that Air Quality Management Zone procedures brought in under the Environmental Protection Act also made this a 'hot topic'"

(Group interview, 18/07/96)

A second, recurring concern within the central study gravitated around a shared belief that potentially-useful resources - in the form of data, expertise and decision-makers - were out there, but were unlikely to volunteer themselves. Commercial sensitivity was widely regarded as a major barrier to access:

"[Ms Petrel] explained that GPs were very loath to share data, such as the number of clients attending a practice with asthma, and it had proved impossible to assess where GPs' clients were from. [Mr Swift] pointed out that GPs were 'powerful players' in possession of valuable insights, but gaining access to their data was extremely difficult. ... [Mr Swift] explained that GPs would never release details of diagnoses on clients and that data about GPs' client groups was increasingly seen as commercially valuable."

(Group interview, 12/02/96)

"... commercial confidentiality's a particular problem for transportation following deregulation as the private sector are now responsible for public transport ... So the

public sector is responsible for private transport and the private sector is responsible for public transport ! ... Given that, although the position has changed, and is continuing to change, the general trend is less and less information is available in relation to any forms of public transport. ..."
(Interview with Mr Buzzard, 09/06/96)

When access could be gained to data sets, the various purposes for which data had been collected, different classification regimes and differing resolutions and spatial/temporal coverage made integration far from straightforward. For instance, descriptions of respiratory illnesses recorded by hospitals and General Practitioners were inconsistent and thus data were difficult to align. Data collection regimes appeared to vary not only between agencies, but over time and across space within the same agency (as new monitoring technologies were deployed):

"[Ms Petrel] asked about the ease with which air quality data could be mapped and [Mr Kingfisher] explained that although coverage was improving - both in terms of the number of stations and the range of air quality measurements being taken - the present level of coverage made things difficult."
(Group interview, May 1996)

"... we spent a fair amount of time talking to the Environmental Health Officers throughout the County, including Bedford, and doing some work trying to match data types, sources, compatibility and, we when we explored that, the first conclusion was (not too surprisingly in an area where there's only limited monitoring carried out for air quality or for travel) the match between existing data sources is non-existent effectively ... And that's probably a lesson that's going to be learned all over the place. ..."
(Interview with Mr Buzzard, 06/09/96)

A fourth theme that characterised actors' dealings with dynamic and emergent issues within the central study, was that data sets were rarely considered to have meaning in themselves. Potentially-relevant data were often indexed to a static spatial location at a

point in time - eg a postcode and a date would identify a respiratory hospitalisation - however, these snapshots were generally regarded as poor reflections of a dynamic situation. Actors frequently identified problems with the picture that could be constructed from available data and recognised an impetus for creativity, learning and bringing together pertinent expertise in order to interpret the limited reflections that were available:

"The meeting discussed the difficulty of exploring 'issues where everything was moving' - pollutants, traffic and people. [Mr Plover] noted that extreme measures, such as radio-tagging the population, were needed to gain a glimpse of the patterns of movement and exposure. ..."
(Group interview, 18/07/96)

"[Mr Kingfisher] explained that, for calculating exposure, Special Workplace and Pedestrian Count studies could provide useful data. He noted the potential of GIS for displaying the data sets but also highlighted that traffic pollution did not necessarily affect people at their home addresses - which was the link to the hospital admissions database. The meeting agreed that the pilot should therefore provide a valuable learning opportunity."
(Group interview, 18/07/96)

Finally, actors within the central study seemed well aware of the precarious nature of the classifications and simplifications that were embedded in the boundaries they worked with as part of their day-to-day routine. The essence of this point was probably best-captured in the extract from a group interview that appears below. The extract refers to the Marsh Farm Estate, a housing estate which straddles a ward boundary; this estate had become the focus for media attention following a civil disturbance earlier in the year.

"... [Mr Swift] explained that Social Services had been happy with the resolution of the analyses they could perform on their data until the Marsh Farm Estate gained a high profile and showed that 'social problems do not respect social service departments' data boundaries !'"
(Group interview, 18/07/96)

Whilst these problems are significant, the conceptualisation of integrated environmental management that emerged in the central study also pointed the way towards attributes of a solution-space.

5.4.2.2.4 PROMISING ATTRIBUTES FOR A SOLUTION-SPACE

First, it is important to note that the actors involved in the data integration project felt encouraged by an increase in the rhetoric of inter-agency collaboration. Analysis of research data revealed a rhetoric for integration founded on the following belief statements:

- Although people were generally doing their best within their current operating structures, an increased emphasis on prevention would, in the long run, enable more effective allocation of resources.
- Preventative approaches must be carefully justified to those with an interest in the resource allocation process.
- Effective, preventative resource allocation necessitates inter-agency collaboration in order to get beyond existing authority, budgetary and knowledge constraints.
- Preventative, inter-agency responses are an ideal that can be difficult to achieve in practice.

Indeed, evidence of these beliefs can be detected in the following extract from an interview with an actor on the margins of the data integration project:

> *"... health authorities are now getting interested in this. Fairly recently they were saying 'right, fine, we don't want to spend money on new hospitals; that money is better spent on preventative work, rather than dealing with the problems' ... we found that we ended up with links with health authorities through our travel awareness work ... you know things like cycling - everyone thinks it's a brilliant idea ... health people think it's brilliant and we think it's excellent, because it's a really efficient use of resources, ... other people think it's brilliant for environmental reasons ... - everyone thinks it's excellent. But, there ain't a lot of cycling going on out there !"*

(Interview with Mr Buzzard, 09/06/96)

Grounded analysis of the data integration team's efforts enabled two distinctive areas of activity within an integrated response to be discerned: networking and group learning. Within the central study the emergence of the concept of networking can be traced back to the brainstorming session in which participants described the process of enlisting appropriate data and expertise in terms of "brokering deals" (section 5.3.2.1.1). Informed largely by Mr Swift's experiences in a jointly-funded post dedicated to ensuring that information was shared between social services and health departments (both inside and outside the County Council), this idea of a brokered network of contacts was developed for the EASI LIFE bid:

> *"[Mr Swift] suggested that jointly-funded posts, such as his own, could provide a 'durable core' to a network which could expand to encompass specialist experience and data sets as required."*
> *(Group interview, 15/03/96)*

> *"The approach of the EASI LIFE Project relies on a key player ... interacting in a 'brokering' capacity with a large number of organisations who will contribute to the project in part on the basis of self-interest - they will gain access to a wide range of data sets on the basis of their contributions."*
> (EASI LIFE Bid, p. 11)

Preparations for the issue workshops suggested that on-going interaction with those agencies that appeared potentially useful, was central to the process of discerning relevant data and expertise. Furthermore, once the existence of potentially-useful data or expertise had been detected, skilful negotiation with the person acting in a gatekeeping capacity for the desired resource was required. Interestingly, Mr Swift suggested that job titles were often a poor guide to identifying the person who eventually proved to be the gatekeeper. His experience emphasised the on-going and determined nature of the task of securing access to pertinent data and expertise:

"[Mr Swift] informed the meeting that he was currently struggling to overcome the problem of an apparent lack of Housing Association information. He wondered if he'd not yet 'found the right gatekeeper' as his present contact at the association which owned 80% of the public stock in Beds, appeared unwilling to share data and [Mr Swift] also noted indications of a low level of technical capability for data manipulation ..."

(Group interview, 17/05/96)

The conceptualisation of networking developed from Mr Swift's accounts accorded with my own first-hand observations of the Planners' attempts to convince Social Services' representatives (including Mr Swift !) of the need to supply sensitive data:

"... [Mr Swift] stressed that the permanence of any integration of data sets was a major concern and he could only agree to data aggregated to ward level being circulated. [Mr Plover] pointed out that household-level resolution was necessary for exploring the fuel/poverty issue and analyses undertaken at household level and ward level would be very different. [Mr Kingfisher] noted that important concerns about confidentiality had been raised and he offered to seek guidance from the Data Protection Registrar on the matter. [Mr Plover] explained that an integrated analysis was 'only interested in particular attributes of a thing' and that he imagined that 'enough detail to match data sets on a household basis' was required but this level of detail could then be abandoned. [Ms Petrel] stressed that the finest level of detail which could be used for identification would be a ward, eg for Social Services Referrals. [Mr Plover] pointed out that 'it depends what is meant by identify' as there are several steps to the processing of the information. [Mr Kingfisher] explained that a GIS system could make correlations at household level but be programmed to report simply the number of correlations in each ward. [Mr Plover] asked whether a 'special person' was required to perform the integration - someone who would guarantee not to divulge any sensitive data to which he/she had access.

[Ms Petrel] stressed that Social Services 'couldn't go lower than ward level' but she acknowledged that integration was only meaningful if done at the lower level. She asked how this problem had been handled in other integrated studies ... [Mr Swift]

explained that his jointly-funded post enabled him to be a legitimate integrator of confidential Social Services and Health Authority data and that a combination key of postcode and date of birth had been used for linking the different databases.

The researcher asked whether, bearing in mind confidentiality problems, data integration was actually feasible. [Mr Kingfisher] responded by noting that the brainstorming and dialogue between the key players might be beneficial in itself. [Mr Plover] noted that there appeared to be emerging support for post-code level correlation of data sets which would only be reported at ward level and would only be maintained long enough to explore potential linkages. ..."

(Group interview, 15/03/96)

Furthermore, there was significant resonance between this emerging conceptualisation of networking and accounts of integrated environmental initiatives undertaken elsewhere (see section 5.4.1.2). The term networking was thus chosen to capture the dynamic challenges of discerning pertinent stakeholders and enlisting appropriate data and expertise. As section 5.4.3 makes clear, this term had a high degree of resonance for those involved in the data integration project. This important concept of networking will be developed further in later chapters, where it will be positioned in the context of emerging conceptualisations of environmental management.

Although not as fully-developed through action as the concept of networking, a dominant concern with promoting group learning - on an interorganisational basis - was evident within the discourse of the data integration project:

"[Mr Swift] noted that the data integration project could offer a mechanism for integrating, analysing and disseminating environmental information which would enable parties who contributed data sets to see their area of responsibility in the context of the 'wider picture'"

(Group interview, 12/02/96)

"[Mr Swift] explained that ... an informal workshop would be held outside of the LIFE project which would pilot the coming together of people and data to explore the issue

> *of traffic-related air quality ... He hoped that the pilot workshop would be a source of learning [for all concerned]"*
> (Group interview, 18/07/96)

In addition to these two key areas of activity highlighted by the central study, the participative approach to the research meant that the conceptualisation of stakeholders that emerged during the study was also a reflection of the sense of audience that the networkers - such as Mr Swift and Mr Kingfisher - used to guide them in their day-to-day activities.

5.4.2.3 SYNTHESIS AND REFLECTION

Looking back on the central study it is possible to see how the content of the data integration project emerged from interplay between the context and processes of Bedfordshire County Council's environmental management efforts. From the research data presented so far, it is clear that the ideals of the data integration project make it the antithesis of a closed-system approach to environmental management. However, whilst there was some evidence of activity similar to the project within the Council, it was consistently regarded as unusual. This suggested that aspects of closed-system management were present within the Council - a conclusion supported by observations made throughout the central study. However, in accordance with Burns et al.'s (1994) findings, the study also indicated that introverted cultures were under increasing pressures to change.

The stakeholder model developed in the previous section, provided a device for highlighting key aspects of routine in which shared ways of seeing and doing were inscribed. This device enabled salient attributes to remain visible when a complex social network was 'punctualised' into a single block - a stakeholder - that could be considered a meaningful actant in the context of environmental issues. The same device is now used to 'punctualise' Bedfordshire County Council in order that a theme within the central study of growing pressures on the viability of an introverted approach to environmental issues is highlighted. Figure 5-7 represents these pressures as puncturing an internally-reinforcing,

closed-system approach to management. Research data indicated that stabilised characteristics of the introverted approach (located inside the circle in Figure 5-7), when set against the Council's espoused environmental commitment, appeared to generate creative tension for the data integration project. The diagram is thus an attempt to provide a rich, succinct and grounded account of the context that produced the integration project.

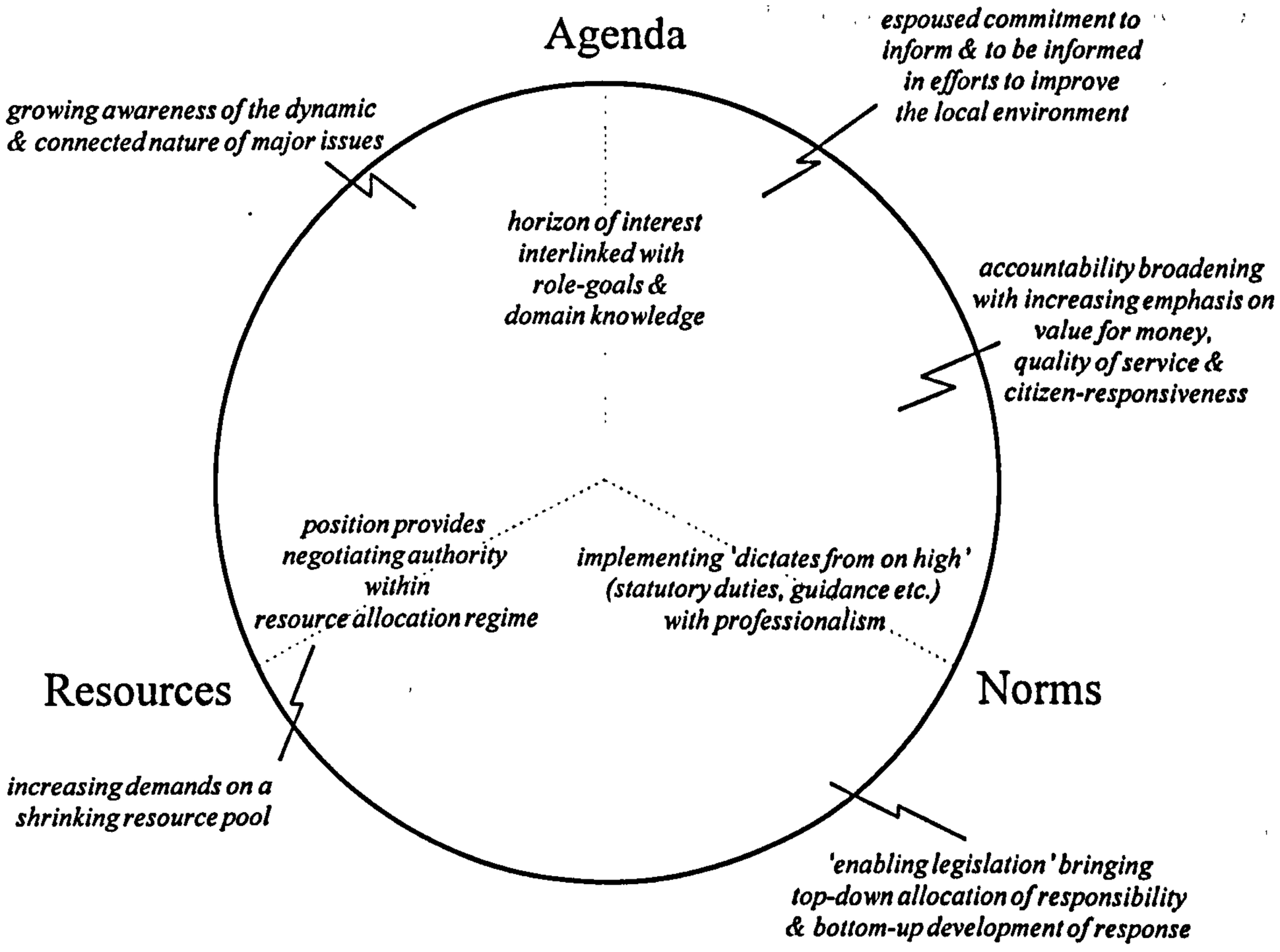


Figure 5-7 Council context in which the data integration project emerged

When the context for the data integration project is presented in this way, Kanter and Eccles' observations offer a convincing explanation for the team's interest in the term 'network organisation' to mark its response to transboundary environmental issues:

> *"[The title of 'virtual organisation' was raised but rejected as a description and, instead, Mr Plover] suggested that the term 'network organisation' appeared to capture the structure of the integration project quite nicely."*
> (Data Integration Project Meeting, 17/05/96)

> "Managers often talk about creating a 'network organisation' when they are trying to change the way the present organisation is functioning. The 'network organisation' is offered as a model that is superior to the existing 'bureaucratic functional hierarchy' and is intended to improve the organisation's capabilities in certain regards by overcoming problems that are perceived as inhibiting its effectiveness. The desired attributes of the new organisation - for example ... tighter cross-functional integration - are typically used to described the characteristics of the 'network organisation'".
>
> (Kanter and Eccles, 1992, p. 526)

The background of uncertainty over roles in the Council following restructuring, appeared to have a significant influence on the trajectory along which the data integration project developed. This was most obvious in actors' skilful attempts to construct the project so that its appeal would endure any anticipated reorganisation. For instance, "*a local database for local people*" would be hard to argue against, as would the value of inter-agency co-operation. More specifically, the influence of prevailing uncertainty could be seen in the 'u-turn' that reversed the original decision not to submit a bid for funding to the EU LIFE programme (section 5.4.2.1). However, determination from key actors, such as Mr Kingfisher and Mr Swift, to ensure a productive outcome for all involved, ensured that the project did not lose momentum once the bid had been submitted. Indeed, the project appeared to help define, as well as support, the roles of its key proponents. In this way, the study highlighted how the project shaped the organisational context in which it was situated. This counterbalances the earlier portrayal of the importance of organisational context in producing and shaping the integration project, and provides further supporting evidence for a mutually-producing relationship between action and social structure (Giddens, 1984).

This does not conclude reflection upon the central study; it will be returned to in later chapters and will be developed further through the account of the traffic-related air quality workshops in Chapter 7. However, in order to reflect the course of thesis development, emphasis will now shift to validating insights gained through the central study and exploring the extent to which the insights have resonance beyond the context in which they were gathered.

5.4.3 VALIDATING EMERGING CONCEPTS AND THEORIES

The exploratory study had demonstrated the value of an on-going strategy of informant validation - the approach was thus continued for the central study. Detailed accounts of each encounter were reconstructed from field notes and returned to informants for comments on their accuracy and completeness. In addition, a thematic map was constructed to summarise development of the EASI LIFE bid (Figure 5-5). Its value as a representation of how and why the bid emerged was then discussed at length with informants:

> *"The meeting then reviewed the researcher's diagrammatic attempt to capture the themes which had emerged in the meetings to date. [Mr Swift] asked who the diagram was intended to be for as it included terms, such as gatekeeper, which may not have meaning for everyone. It was therefore suggested that the diagram was best accompanied by a short piece of narrative. [Mr Plover] suggested that an explanation of the different notational standards should also be included in the accompanying text. [Mr Kingfisher] sought clarification on the point about the need for a vehicle to legitimise information improvement efforts and suggested that varying degrees of frustration over making progress on environmental issues should also be emphasised. Overall, the meeting felt that the diagram was a fair and accurate reflection of the themes which had been raised in the meetings to date and that it was important to stress the undercurrent of uncertainty arising from restructuring, particularly the loss of Luton - [Mr Kingfisher] explained that the effect of losing Luton was a 30% cut in funding although Beds County still maintained about 90% of its original workload."*
>
> (Group interview, 18/07/96)

The strategy of interweaving data gathering and data analysis - characterised by constantly encouraging informants to reflect upon the development of the data integration project and to validate my emerging appreciation of what was going on - lends strong support to claims of empirical fidelity for the study. Indeed, a brief review of the study's grounded theory of "networking" provides clear illustration of this point.

Theoretical sensitivity brought to the study from the literature survey (Chapter 2) and the exploratory study (Chapter 4), was developed through interviews and observations of key actors in the data integration project. A significant, on-going concern with securing participation from decision-makers across organisational boundaries was detected which was subsequently explored through focus groups (5.3.2.1) and relevant literature (5.4.1.2). The EASI LIFE bid proposal and preparations for a pilot workshop accelerated the process of group learning about the practicalities of data integration. The spirit of reflective inquiry promoted through group interviews, enabled a shared understanding of the concept of networking to emerge. This concept was validated through a mutually-informing dynamic set up between dialogue and action (5.4.2.2.4). In this way, the challenge of mobilising appropriate resources - particularly data and expertise - to respond to complex issues that transcend organisational and disciplinary boundaries, became clear.

The priority now was to explore the extent to which the ideas that had emerged from the central study had resonance beyond the setting of Bedfordshire County Council and the data integration project. Consideration of audience is essential to this process of assessing resonance. This point will be developed in the section that follows and expanded upon in the next chapter.

5.5 COMMUNICATING FINDINGS

Unlike the exploratory study, in which a major period of analysis was undertaken after sustained contact with the organisation; the central study placed greater emphasis on setting up a mutually-informing dynamic between data gathering and data analysis. This meant that attempts to communicate findings to those involved in the data integration project were on-going. For this audience, communicating findings was a process, not a one-off event. Earlier sections have described in detail the strategies employed for communicating my understanding to informants - for example, the thematic map (Figure 5-5) and the articles and academic papers that I believed to describe similar experiences (Table 5-2). These communication strategies promoted dialogue with informants that

they and I regarded as useful. However, the guiding philosophy for thesis development encourages consideration of the value of sharing insights with others, not just those involved in the immediate research setting. The following sections will thus concentrate on audiences outside Bedfordshire County Council.

5.5.1 IDENTIFYING AUDIENCES

In attempting to generalise from insights gathered in the central study, potential audiences become clear. The central study had set out to explore how a group of actors dealt with the challenge of developing an informed response to complex environmental issues. Protracted contact with those actors had revealed the importance of networking - individuals interacting skilfully with decision-makers controlling access to data and expertise useful for dealing with a particular focal issue, in order to mobilise those resources into a coordinated response. Furthermore, the study had revealed something of the complexity of integrating insights and experience from perspectives grounded in diverse circumstances, developed in different organisations and disciplines, for different reasons. Indeed, it had highlighted significant tensions between traditional boundaries drawn upon in dealing with environmental issues and the "mess" (Ackoff, 1981) that characterised environmental problems. Intuitively these findings seemed likely to be resonant with the experiences of other actors who had assumed responsibility for dealing with environmental issues. The process of contemplating settings where such actors might be located provided further evidence of how a sense of audience can contribute to thesis development.

In considering the UK first, local government has been identified as an institutional tier well-suited to taking lead-responsibility on environmental improvement (Blowers, 1993). Looking beyond Bedford, local government elsewhere in the UK would clearly constitute a likely setting for finding individuals for whom the central study is directly relevant. Also, in the UK, recent re-organisation of environmental regulation into a "one-stop-shop" Environment Agency, suggested that this would similarly constitute a suitable setting for exploring the resonance of ideas and theories developed in the central study. If an extended boundary of environmental responsibility is considered, ie beyond statutory

environmental responsibility for geographical regions, then further potential audiences can be identified, such as within environmentally-conscious business, environmental organisations and pressure groups. In presenting this widening sphere of potential interest, the relative importance of environmental issues compared to organisations' other priorities, is raised. Although touched upon in Table 5-3, this will be returned to in later chapters.

When contemplating engaging audiences beyond the UK in conversation about the usefulness of the findings, practical constraints on securing face-to-face dialogue are raised. However, interaction with texts, such as international journals, and participation in relevant international conferences, offer a potential way forward that will be developed further in the next chapter.

5.5.2 DESIGNING EFFECTIVE COMMUNICATION

This chapter has provided a detailed account of the dialogue that surrounded the data integration project, and has articulated the rationale behind the various communication strategies that were employed in studying it. Strategies for engaging audiences outside the Bedfordshire data integration team will be considered in the following chapter where a description can be found of a series of investigations designed to explore the resonance of ideas and theories developed in the central study.

5.6 SUMMARY

The research agenda that emerged from the literature survey was subsequently refined through exploratory work. This led the central study to focus upon a network of County Council actors engaged in developing an informed response to complex, transboundary environmental issues. Their efforts revealed the critical importance of networking: seeking out pertinent data and expertise across organisational boundaries and mobilising those resources into an integrated response. The study also highlighted the problematic nature of such integration. Even when relevant data at an appropriate resolution existed and access to those data sets could be secured, their meaning was far from clear. The dynamic complexity of interactions between processes operating at different spatial and

temporal scales was generally-considered to be poorly-represented in available data on environmental phenomena. In other words, the data sets did not have meaning in themselves. The study thus identified the need to bring together pertinent experts and decision-makers to learn about managing these complex issues together. However, it also revealed that such transboundary, inter-agency activity was a long way from the County Council's traditional modes of operating. The research agenda was thus further revised. The immediate priority was to explore the resonance of these ideas beyond the setting of Bedfordshire County Council. If these ideas had sufficient resonance, then the process of bringing together pertinent data and expertise with a view to learning about a complex environmental issue would constitute a valuable conclusion to the fieldwork. The next two chapters describe how this revised agenda was pursued.

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6. EXPLORING RESONANCE OF THE EMERGENT THEMES

This chapter will evaluate the extent to which the themes raised in Chapter 5 have resonance beyond the context of Bedfordshire County Council in which they were grounded. Research activities undertaken to assess resonance will be described, and insights gained will be reflected upon, in order to extend the concepts and to clarify the concerns that emerged in the central study. These activities involve two settings in particular: the Environment Agency and the Local Agenda 21 process in Bury, Greater Manchester. Research activities in these settings do not constitute studies in their own right; as Figure 6-1 suggests, each research engagement sets out to develop the ideas that emerged from the central study by exploring the extent to which the concepts and concerns have meaning beyond Bedfordshire County Council.

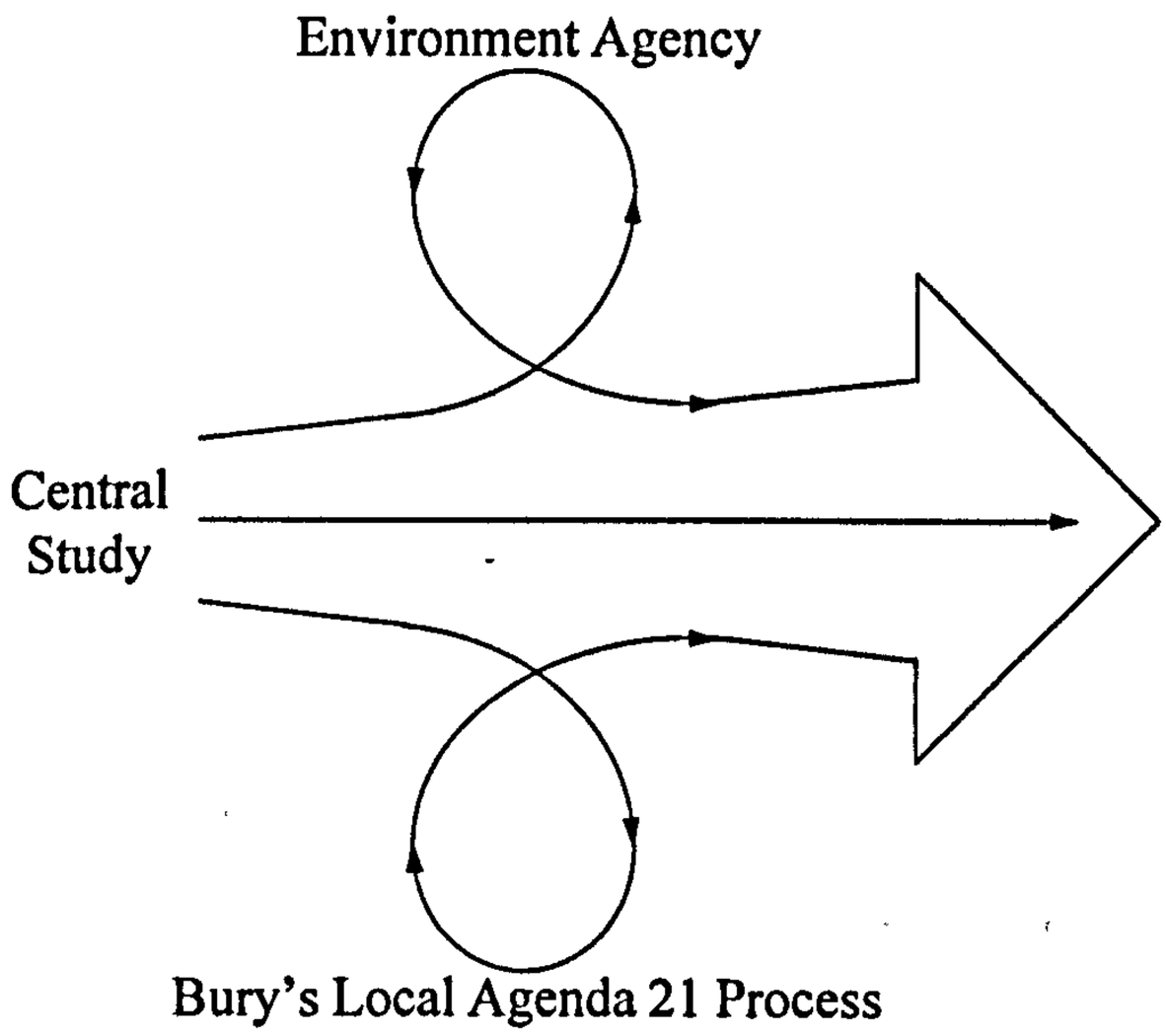

Figure 6-1 Exploring resonance of the emergent ideas from the central study

The chapter will conclude by highlighting a resonant but under-developed concept that requires further exploration in the field: the idea of group learning.

6.1 EMERGENT THEMES

A number of recurrent themes have, so far, been discerned in actors' dealings with complex environmental issues. These themes have emerged from detailed investigation

of two attempts to base interventions on holistic understanding, or "*a feel for the bigger picture*". The themes can be summarised as follows. First, actors acknowledge major drawbacks with compartmentalised responses to environmental issues; however, they also recognise that existing organisational routine predisposes them towards such responses. Second, where attempts are made to integrate insights and expertise across organisational boundaries, the concept of "stakeholders" provides a useful (if temporary) classification of variety in pertinent concerns and resources. Furthermore, the dynamic nature of the task of bringing together appropriate resources is well-captured by the term "networking". Indeed, the associated role-description of a "broker" reflects strong evidence that this task presents challenges that are considerably more than a technical puzzle. Third, actors identified as being appropriate members of a response-network for a particular environmental issue tend to interpret environmental phenomena, and their representations, differently from one-another. In other words, environmental data do not stand alone. An integrated response requires not only data to be shared, but also the mental models on which actors draw to interpret those data. Those who assume responsibility for developing such responses must therefore be guided by a sense of audience - something which **Table 5-3**, p. 164, has attempted to enhance. Finally, and in further demonstration of the first point, the implied emphasis on transboundary learning tends to run contrary to predominant organisational routine.

These emerging ideas are grounded in a dialogue set up between the literatures of environmental management and organisational learning, and experiences gained through participative fieldwork in two different organisations. Before pursuing them further, it seemed prudent to explore their resonance beyond the settings of Bedfordshire County Council's integration work and WasteCo's environmental monitoring, which inspired them. However, this process of exploring resonance deserved careful thought; simply asking randomly-selected people whether the ideas accorded with their own experiences of environmental issues, was not sufficient. If the ideas constituted a genuine contribution to knowledge then they should be capable of informing salient practitioners and shaping further research activity. This test provided the impetus for exploring resonance, and revealed a novel use for the research framework developed in Chapter 3. The sections that follow present fieldwork activities undertaken to explore resonance.

Insights gained are then reflected upon using the framework as a structuring device, and a final direction for fieldwork activity is proposed.

6.2 EXPLORING RESONANCE IN THE FIELD

Of prime importance when assessing resonance of research ideas is consideration of where and with whom the ideas should strike a chord. Following on from the central study's consideration of audiences appropriate for communicating its findings, initial activities in this third phase of the fieldwork gravitated around selecting research settings appropriate for exploring resonance.

6.2.1 IDENTIFYING RESEARCH SETTINGS

When attempting to identify suitable settings in which to explore resonance, it is important to note that the emerging ideas raise concerns over the suitability of organisational structures for responding to environmental issues. In order to develop this point, recent structural innovations for responding to environmental issues within the UK were examined and, of these, two seemed particularly deserving of further investigation. These were the recently re-organised Environment Agency and the Local Agenda 21 process. Whilst the former may be an obvious choice, literature suggested that the latter was struggling to find its place within existing structures of local government (Voisey et al., 1996).

The ideas also raised the importance of mobilising pertinent insights and expertise into an effective response network - something which the exploratory study had shown to be problematic within organisations, as well as between them. This concern with intra- and inter-organisational coordination, further strengthened the rationale for focusing upon the Environment Agency and even provided an initial contact name for 'getting into' the third phase of the fieldwork, as the Environment Agency had signed up as a partner to the LIFE bid featured in the central study.

Rather than electing to study one of these two settings, I decided to explore resonance within both. As a starting point for the Environment Agency, I decided to contact the signatory to the LIFE bid document, Mr Osprey, as I hoped that he would be well-placed to discuss the challenges of developing both intra- and inter-organisational responses to environmental issues. For the Local Agenda 21 (LA21) process, I chose to follow-up an article in my local newspaper that described how an Environmental Forum had recently been established in Bury to fulfil the requirements for LA21 and local Councillors were keen for *"more local residents to get involved"*. I hoped that a study on my doorstep would facilitate regular contact with pertinent actors and enable unique insights to arise from my dual role as researcher and local resident. The ideas that had emerged from the fieldwork directed me to these two settings. The following sections describe my efforts to explore the extent to which those ideas were resonant with the experiences and realities of actors within each setting.

6.3 THE ENVIRONMENT AGENCY

On April 1, 1996, the Environment Agency for England and Wales was formed. Encompassing Her Majesty's Inspectorate of Pollution (HMIP), the National Rivers Authority (NRA), local Waste Regulation Authorities (WRAs), and certain Department of the Environment staff, it was charged with protecting and enhancing the environment in an integrated manner. Employing about 9,000 people, the new Agency's day-to-day operational work has been organised into 8 regional groups. One of these, the Anglian Region (which claims to cover about 18% of England and Wales), had supplied a letter of support for the LIFE bid featured in the central study. It had also featured in informants' comments in the exploratory study. In August 1996, I telephoned Mr Osprey, a senior manager within the Agency, and explained that I had been involved in the Bedfordshire LIFE bid and was keen to learn more about the issues of coordinating activity across organisational boundaries that it had raised. He agreed to a meeting for which an anonymised transcript would be produced - extracts from this appear below.

The meeting opened with Mr Osprey introducing the revised structure of the Anglian Region of the EA which appeared to be strongly-influenced by local environmental

protection priorities - particularly flood defence for the low-lying east coast - and was thus dominated by the former NRA:

> *"If we take this region: about 90% of the resources have come from the NRA; 9.5% have come from Waste Regulation Authorities - which were part of County Councils - and ... the other bit came from HMIP - it's ... quite a small proportion of the human resource side, and I suppose the financial resource side affects that because the major financial resource actually in this region is to do with flood defence work and that's where major capital comes from ..."*

He then proceeded to describe a matrix management structure (see Daft, 1994, pp. 308-310), organised around functional and regional responsibilities, and highlighted some of its consequences for daily life within the Agency:

> *"You've always got tension between operational delivery and policy implementation ... That's the tension that exists in the organisation. The tension between getting the job done while faffing about - 'there's a problem here, let's sort it out' and actually 'how do we want to sort this problem out ?' 'Is this the best way to do it ?' 'Have we got our strategy right in terms of what we should be targeting effort on ?' ..."*

As he elaborated upon how these tensions were being felt in the new organisation, he reinforced the message that had emerged in the central study, that introverted environmental management cultures were under increasing pressures to be less myopic and less closed. He also appeared to be aware of problems of inconsistency, particularly in waste regulation - a criticism that several informants had made in the exploratory study:

> *"[The Agency is really] a new organisation where we've got three different cultures coming together: You've got the civil service ... HMIP culture, which is very centralised - strong direction from the centre and strong management and quality assurance from the centre. You've got the local authority, '57 varieties' ... one of the reasons for bringing it together ... the Agency itself ... is to enforce consistency. They*

were almost like little stand-alone units and accountants didn't take much interest in them generally - though they are now ! Then you've got the NRA which is an agency which has its onus drawn out by the local authority culture and the water quality culture, but ... it is very different ... it's got different dynamics to the others ... it's wrong to make judgments ... but certainly some are more go-ahead than others and have a different approach ... So ... there's an element of learning from each other, but ... sometimes we just don't get on with it"

I then guided the conversation to consider the role played by information in problems of consistency and in the "*tension*" between acting locally and thinking about the bigger picture:

"[E]ach Region has its own history ... it comes down to the people who were there over the last 20 years, so we're talking about both processes and actual critical information systems which reflect that. So, you've got a vastly different inheritance and a constant debate about whether you've got a corporate architecture at the top of the organisation or not. If you really think about it - how much information does need to be managed nationally ? And this is where the State of the Environment Reporting is fitting in ... - because that's a national report you've got a two-way flow of information ... Mind you, there's still a bit of debate about how necessary it is that we move national down to local and back up again and get that to work ...

So, what it tends to be is, you will have a patchwork of national initiatives that will try to drive delivery of particular data products across the country ... there's been an attempt to manage that as a national data collection exercise, but it's very much delivered in a regional way to meet regional needs. One of the major things in this organisation is to do with where funding comes from ... a lot of our funding is actually funded without much direct grant and aid, but each of those areas is ring-fenced ... so that can impact on how strongly you can manage national diversities in some of these initiatives....

[A standardised data management system] should work, but it doesn't seem to work for our organisation. So, it's time we recognised that. It's worked in HMIP, but they were a small, tight organisation - the Agency isn't !"

Mr Osprey's words on the importance of, and significant challenges inherent in, establishing an infrastructure to support the integration of environmental data, echoed those of informants in earlier fieldwork (particularly in the exploratory study), and the magnitude of the challenge prompted me to ask about the structures that seemed to be providing most incentive for integration. In his reply, Mr Osprey highlighted the critical role that Local Environmental Action Plans (LEAPs) played in this regard:

"... [LEAPs] are based on surface water catchments ... it's how we pull together functional strategies ... It's pulled together at local level but, in a sense, it's feeding up again as well, and that's the mechanism that we've got to make work. ... It's the core multifunctional activity. It's one of the few times that you get every function at an area level together to talk about all of the issues ... It's a very important process internally, we have external objectives to be open and accountable, getting people to sign up, because, at the end of the day, what comes out of it is ... an action plan. ... you've got options, and who's responsible, and money ... so it's actually part of the business planning process.

Whilst the concept of stakeholders appeared to be extremely useful in interpreting the LEAP process at a strategic level, I was interested in how the blending of different perspectives worked on an interpersonal level. My question received the following response:

"It's just people talking, arguing, discussing, banging their heads against old walls, getting on old hobby-horses ... you know, looking at the information. It's a negotiation basically ..."

Mr Osprey's comments provided support for the emerging conceptualisation of integration as a process of group learning and drew attention to the barriers to learning that had been recognised within WasteCo and the Bedford data integration project. When asked to elaborate on how the process worked and how it might be improved, Mr Osprey raised the importance of a sense of audience:

"... I think the key thing that is moving this forward is that you've got such a mixture of objectives ... so you've got to decide who your customer is and our trouble is that we've got too many customers for this one product ... [There's pressure from some quarters to] develop the idea of community participation ... If your desire is to maximise community participation then a totally different approach is required to what we're doing. I don't think that we can maximise community participation and that's in terms of positioning - we would be cutting across the Local Agenda 21 process and we cannot ... it'd be a minefield. There's some people I think would welcome it ... they want someone to lead it, but we can't. ... I suppose the way we'd see a LEAP, or a catchment plan, is to be our contribution - a clear statement about what we're doing."

His later words echoed the challenge (highlighted throughout the fieldwork) of creating the incentives and space necessary to think about the bigger picture, whilst still fulfilling local responsibilities:

"... I think there's a fear of the resource requirement really, and it's difficult enough to carry out the regulation and the on-the-ground activities that are monitored, as well as the internal activities; whereas these [holistic initiatives] must fit in too. If you're an area, on-the-ground person, ... you can't spend all your time doing plans - they sit on top of everything else that you're doing."

As he expanded upon the Agency's response to this challenge, it became clear that plans played a critical role in coordinating effort, both internally and externally. He then produced a model that summarised pertinent links between plans and relevant actors, as he saw them:

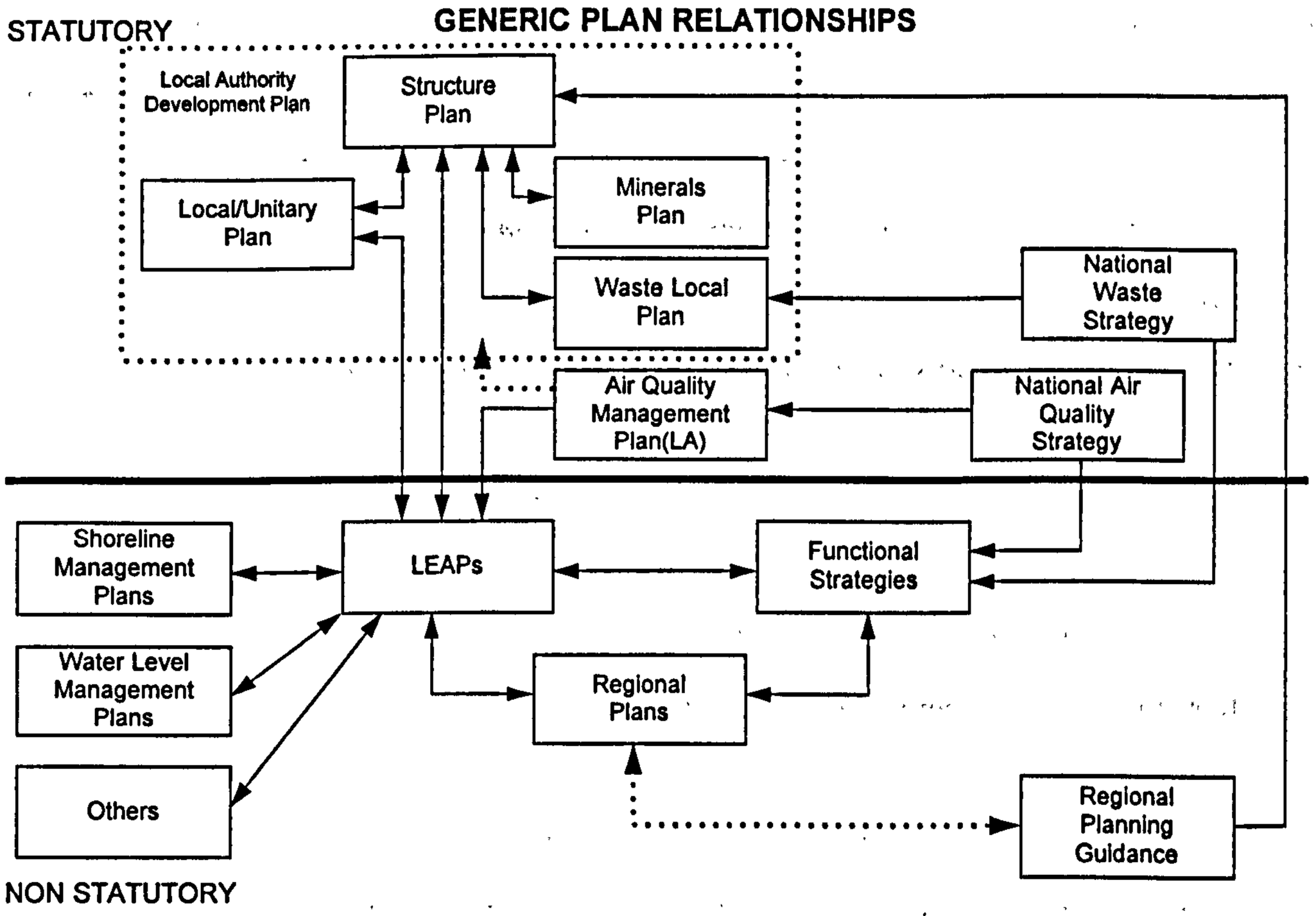

Figure 6-2 Generic plan relationships for the Environment Agency

This model (like previous fieldwork) highlighted the importance of interorganisational relationships, prompting me to ask about how Mr Osprey saw the Agency's relationships with other bodies, particularly the County and District Councils. His response provided support for the "issues-stakeholders" model developed earlier:

> *"I see us primarily as an information provider. I think they would like to see us more heavily involved ... [but] I don't think that we've got the resources to do that. ... Particular individuals will be involved in their own right because they have their own interest and involvement in their community. Therefore they will bring their expertise to those discussions, but it's our view that we have to be mindful that Local Agenda 21 process is a community-led process. Increasingly, we will have to provide technical guidance ... but we've got to find an easy way of doing that ... [I]t's an important context for how we contribute to sustainable development. I don't think we shouldn't be doing it. Sustainability only makes sense in the context of other people's plans because they have the economic, social and health side that we don't have. ... [M]y own personal view - not an Agency view that's been explicitly said - is that ... we make*

the best contribution by saying 'here we are, this is what we've got to say, this is how we see it' and having a healthy contribution to the debate, ... [r]ather than internalising sustainable development in ourselves and becoming a public authority. ... I think the key integration areas happen in Development Plans, and I suppose in Local Agenda 21 - that's where a lot of the synthesis will take place, the rise of a local understanding of what sustainability means in that particular community"

Indeed Mr Osprey revealed that this search for an appropriate role for the Agency, helped to explain his decision to become involved in the EASI LIFE bid. In considering further the process of learning where and how the Agency could act most effectively, Mr Osprey lent further support to the central study's conceptualisation of "networking":

"[W]e've got supervisory committees and part of the key thing is that they come from a wide range of interests - local authorities, industry or whatever. ... [T]heir key role is in advising the Agency on how to consult or act on particular issues; so there is that external influence which should enable us to look beyond ourselves a bit more. The LEAP process is actually all about developing partnerships ... and that again, that's at a local level, and then it's just a case of ***networking.*** *You know we're talking to the Government Office for Eastern Region, because they have a role as a link between central government and local authorities. ... So there is an active process of identifying key [makes quotation signs in the air]* ***'stakeholders'*** *that we should work with ..."*

Having allowed the conversation to develop with minimal guidance, I concluded by asking Mr Osprey directly about the extent to which the study's emerging themes were resonant with his own experience:

"[Researcher] If it's possible to gain some feedback ... the ideas that are coming through most strongly in the research so far are: the importance of developing a sense of audience; ... this whole business of how to make the process of pulling together different perspectives actually work; ... the trade-off / dynamic tension between long-term and operational concerns; ... And also, I suppose linked with that, what's core

and what can you give people the freedom to explore locally ? ... Those appear to be four themes which are coming through strongly ...

[Mr Osprey] Yes. I think that's what we've got ! You know it always varies according to the organisation - its history and its current management - as to how it tackles those. Clearly we're driven by legislation but we need a strategy to help us make the best of that ... We need to pick up on the multi-functional role of the Agency ... The talk round here is of 'taking the blinkers off but not taking the eye of the ball' - if you have a multi-functional view to pick up on the interactions you might not focus on particular issues which require technical expertise ... the technical and general expertise need to work together."

We then shared our views about how this problem could be tackled and there were some remarkable similarities, particularly regarding the need for creative dialogue:

"[Mr Osprey]... As a manager I need tools to help me be creative ... to break down barriers. In fact, we had a brainstorming session last week ...

[R] At Beds we also ran a creative thinking workshop ... I'll stick some details in the post ...

[Mr Osprey] That'll be really helpful because what I've been talking to my manager about is looking at the mediator/facilitator role ... you've got a matrix of area/regional issues, ... an objective, outside influences, and you set up the terms of the two. So you've got that side and then the facilitator role - you normally bring people from outside in to facilitate, in team-building and things like that, but actually I think that it's a mentality that has to be applied to all meetings and problem-solving sessions ...

At the end of the day it's about finding the things that we can all use without having to go to a major effort - they have to be a natural part of what we do. So, either we've got to change our perceptions of some of these things, or we've got to modify them so that they fit our culture ... It's a classic problem of integration ..."

Ideas raised in the interview were followed up through analysis of Environment Agency documents, and external commentaries on the Agency and the challenges it was facing (for instance, Hooper and Preece, 1997). The following extract, from a Department of the

Environment statement on the Agency's management agenda, is indicative of the material which suggested that the priorities and challenges Mr Osprey had been careful to present as his personal opinion, were likely to be shared by many of his colleagues:

> "Ministers have underpinned the Agency's principal aim by setting it seven main objectives governing the manner in which it should carry out its functions. These are:
> - to adopt, across all functions, an integrated approach to environmental protection and enhancement which considers impacts of substances and activities on all environmental media and natural resources;
> - to work with all relevant sectors of society, including regulated organisations, to develop approaches which deliver environmental requirements and goals without imposing excessive costs (in relation to benefits gained) on regulated organisations or society as a whole;
> - to adopt clear and effective procedures for serving its customers, including by developing single points of contact through which regulated organisations can deal with the Agency;
> - to operate to high professional standards, based on sound science, information and analysis of the environment and processes which affect it;
> - to organise its activities in ways which reflect good environmental and management practice and provide value for money for those who pay its charges and taxpayers as a whole;
> - to provide clear and readily available advice and information on its work;
> - to develop a close and responsive relationship with the public, local authorities and other representatives of local communities, and regulated organisations."
>
> (DoE, 1996, p. 2)

6.4 BURY'S ENVIRONMENTAL FORUM AND LOCAL AGENDA 21

The newspaper article, entitled "Taking a green look into the future", that had highlighted Bury's Environmental Forum contained several quotes from a local councillor about the need for community involvement, but it did not include a contact number. I therefore decided to contact Bury Metropolitan Borough Council (MBC) for further details. This

move revealed some interesting information dissemination issues and reinforced some of Mr Osprey's comments regarding LA21's ill-defined role within existing structures of governance:

[R] ... I wondered if it might be possible to talk to someone there about Bury's Local Agenda 21 initiatives - they're mentioned in a local newspaper article.

[Switchboard] Local Agenda 21 ... you've got me on that one. Can you tell me a little more about the newspaper article ?

[R] The article describes how "residents are being urged to join in and improve the Borough's environment for the next century" ... It mentions Bury's Environmental Forum ...

[Switchboard] I'll try putting you through to our Environment and Housing Department ... see if someone there can help you. Hold on.

[E&H#1] Hello. Environment and Housing Department, how may I help you ?

[R] Oh hello there, I was hoping to speak with someone regarding Local Agenda 21 and the Council's Environmental Forum initiative, do you know who I should talk to ?

[E&H#1] You've lost me there ... Local Agenda 21 did you say ? Could you tell me what it's all about ?"

...

[E&H#1] Hang on, I'm going to try putting you through to somebody

...

[E&H#2] I'm sorry, I'm not familiar with it, could you explain a little more ?

...

[E&H#2] It sounds like a corporate thing to me. I've heard about a new Environment Working Group, some sort of joint initiative involving all the departments, I'll see if I can put you through to someone who knows more about it ..."

(Telephone conversation, August 1996)

After a further spurious transfer, I eventually reached the Policy Development Officer with special responsibility for the Environment, who explained that his role was fairly new and that he was responsible for ensuring that a LA21 action plan was produced by

the end of 1996. His description of the challenges that this would entail was strikingly similar to those encountered in the fieldwork undertaken elsewhere:

> *"I've got a team of 7 staff and a facilitator. ... we're all on TQM here, so we've organised a sort of interdepartmental quality circle which has been running for 4 meetings. We're still at the 'forming/storming' stage, but we've got to get productive soon. ... We've not got a database or anything like that to help us, but the staff in the interdepartmental team are close to the issues, so I hope they'll be able to pool their insights. ... It's like an ever-widening circle. We used to talk about environment, now we talk about quality of life - to avoid all those images of tree planting and frog saving ... - there's such a lot of angles to cope with. ... There are so many perspectives on all these issues."*

Over the next few months I attended several meetings of the Environment Forum, and its constituent Subject Working Groups (SWGs). The themes for these SWG meetings followed a categorisation adopted in a neighbouring borough: Economy and Work; Energy; Transport; Waste and Pollution; Natural Environment; and Built Environment. The SWG meetings were not particularly well-attended, although the Transport SWG drew a regular twenty-or-so individuals - councillors, officers, transport operators, interest groups and community representatives - for often heated debate. Discussion about processes pertinent to a particular subject would regularly spill over into what was generally-considered to be the territory of another SWG. Participants often expressed concern that the meetings should be "*something more than just a talking shop*", but seemed unsure as to what that "*something*" could or should be.

The SWG meetings suggested that fears expressed in the central study regarding the problems of promoting effective dialogue, were well-founded. Contributions often seemed far removed from the atmosphere of non-judgemental learning that Senge (1990) suggests as being appropriate for exploring complex, value-laden issues:

"... We all know that the problem is too many cars. But there's no answer that makes sense because people like their cars and there's more P registrations than ever before! ..."

(Extract from a Transport SWG)

Throughout the meetings a number of themes were recurrent. First, there appeared to be a general feeling that problems were becoming more acute, although this was rarely supported by anything beyond anecdotal evidence. Second, descriptions of pertinent processes often made reference to "*vicious circles*", either explicitly or implicitly:

"People don't use the bus stations because they don't feel safe, and you know how intimidating empty bus stations are ..."

(Extract from a Transport SWG)

Third, a feeling of helplessness and hopelessness - resonant with McNaghten et al.'s (1995) findings regarding a lack of agency - seemed to be prevalent:

"[Researcher] Am I right in thinking that the main problem here seems to lie in the feeling that 'I can't make a difference' ?

[] Too right !

[] That's it exactly"

(Extract from a Transport SWG)

Indeed, concerns about how the meetings would actually produce change in Bury were often expressed with extreme frustration:

"[Secretary] Perhaps, we could draw up a list of information that we think would be useful to us ?

[Resident] This scientific obsession with data and factors is not going to help. All I am hearing is talk. Where is the action ?"

(Extract from a Transport SWG)

Partly in response to these concerns about action, a common structure was developed for identifying and describing projects to improve the local environment. Projects devised in the SWG's were to form an integral part of the action plans for Bury's Local Agenda 21 Strategy. The structure for specifying the projects was thus the subject of considerable debate, with clarity, comprehensiveness and accountability emerging as critical criteria. Following an initiative in a neighbouring borough, an approach was proposed that was based upon specifying objectives, actions to be carried out, and measurable targets. At a meeting in which I was an active contributor, this was subsequently refined to include: time scales - on which the action would be monitored; and partners/resources - that would be drawn upon in implementing the project. This second addition marked a direct contribution from the stakeholder concept developed in previous fieldwork. Furthermore, this addition was considered sufficiently meaningful to be included in all action plans in the Local Agenda 21 Strategy document when it was eventually released for consultation in February 1997.

Attempts to assess the resonance of the central study's core concepts were not limited to the LA21 SWG and Environmental Forum meetings. A number of interviews were undertaken with officers whose responsibilities encompassed environmental issues raised in the LA21 process. These interviews supported the "issues-stakeholder" conceptualisation developed in the previous chapter, and demonstrated that the attributes of its associated problem-space had resonance beyond the setting which originally inspired them. This resonance can be seen in the following extract from an interview with a senior transport engineer:

"We have [pedestrian count data] available but ... we can't relate it to pollution - it's just in terms of usage of certain areas of the town centre. And this is the difficulty we've got ... It's trying to get meaningful stuff because these machines or gadgets that they've got in Environmental Health really do need to be down for so long ... absolute minimum 3 months, desirable 6 months and probably really 12 months. ... And that's why it's really important that not only do you use a site where hopefully you can get something meaningful from it, ... [you also put it] where there's going to be a change - it's no use going and doing it down the A56 if you've got nothing to compare it to ...

We did discuss where we should put it and one of the areas we considered was ... whether we should put it at the [bus and light-rail] Interchange, but I'm not sure that gives you the right answer anyway because that's a definite high. You could talk about putting it on Kay Gardens but you've got taxis chucking out stuff all the time there ... I feel you're really only looking at the thing properly where you've got moving traffic and you can do something about it. The only thing you could do if you were to put the monitor at the taxi rank or the bus station, would be to shift them and if we do that we'd be defeating our other objectives wouldn't we - you just can't win !"

Some evidence of actions and structures resonant with attributes of the solution-space that appeared promising for the central study, was present. This was detected in an interdepartmental officer presence at some SWG meetings; the Council's newly-formed Environmental Working Group; and a regularly espoused need for collaboration by all local agencies. This final point was demonstrated graphically at the official launch of the LA21 strategy document where a lead presentation by a senior health authority officer was driven by a cartoon about the left hand not knowing what the right hand was doing.

Whilst each study showed the central ideas within the thesis to have resonance beyond the setting in which they originated, in-depth reflection upon the two was necessary to ensure that opportunities for thesis development were maximised.

6.5 REFLECTION

In order to structure the process of reflecting upon the experiences gained through contact with the Environment Agency and Bury's LA21 process, the four interlinked research objectives, developed in Chapter 3, will be used as the basis of a framework for assessing the value of the central study's ideas.

6.5.1 GETTING IN AND GETTING ON

Although section 6.2.1 gave some consideration to suitable settings to 'get-in' to, it is also useful to look back on how the ideas opened up avenues for research. Whilst others may

be better placed to evaluate the research agenda that the ideas create (see 6.5.4), it is important to record how the ideas contributed to the ease of negotiating access to the two settings. In both, my mention of an interest in transboundary responses to environmental issues was warmly received, and brief summaries of work undertaken so far prompted requests for further information on how integrated initiatives could be visualised and facilitated:

"[Mr Osprey] So it's about trying to arrive at a process ... ?
[Researcher] I'll stick some details in the post if you'd like.
[Mr Osprey] That'll be really helpful because what I've been talking to my manager about is looking at the mediator/facilitator role ..."
(Environment Agency Transcript)

"I'd be interested in those visioning techniques though - there's such a lot of angles to cope with ..."
(Bury MBC's Environmental Policy Officer)

In both settings this interest appeared to create opportunities for participative research. Indeed, Bury's Environmental Policy Officer was already considering whether he had the necessary resources to develop the relationship along similar lines to the Bedfordshire work:

"My team could use sessions like that. Just putting another hat on for a minute, how much would it be likely to cost ?"

6.5.2 GATHERING DATA

In terms of the process of gathering data, the "issues-stakeholders" conceptualisation provided a guiding framework for choosing to engage in research encounters. As Bury represented more sustained contact, the notion of exploring how issues were constructed by those present in the SWG meetings, and then following up pertinent stakeholders in those issues (such as Council officers) outside the meetings, was an effective

implementation of the central study's emphasis on following the network of pertinent actants.

Within encounters, the "issues-stakeholders" conceptualisation guided conversation which quickly led to some revealing insights about the perceived adequacies of current environmental management responses, and about the major drivers for key actants.

6.5.3 GENERATING THEORY

In considering the strengths and weaknesses of the "issues-stakeholders" conceptualisation for interpreting the insights gathered from this third phase of the fieldwork, it was apparent that the strengths of the model lay in the strategic guidance it offered to those who had assumed responsibility for developing an integrated response, particularly those who saw resonance between their duties and the idea of a network broker. However, when representatives of diverse stakeholder groups were brought together to explore a chosen issue, it seemed that the intended atmosphere of group learning was unlikely to happen naturally. Indeed, both settings provided strong indications that a spirit of group learning needed to be worked at. This suggested that the promising attributes of the solution-space needed further explication so that they had meaning on an interpersonal level, as well as on a strategic level, and could thus provide guidance on establishing effective dialogue. In negotiating access to the two settings, unanticipated interest in the brainstorming session carried out in the central study suggested that it deserved to be revisited in efforts to develop the conceptualisation on an interpersonal level. Those efforts are described in the next chapter.

6.5.4 COMMUNICATING FINDINGS

Although the two setting had proved extremely valuable in assessing the extent to which ideas were resonant beyond the settings that had inspired them, further clarification of their value was sought. Following the sense of audience principle, I decided to engage academic peers in conversation about the usefulness of the ideas.

I initially considered using the 'refereeing' process of a respected environmental management journal to develop a conversation about my ideas with an experienced and critical audience. However I judged that the delays this might create would be unhelpful if I wished to develop the favourable research relationships I had established. In particular, I was concerned about letting my contacts 'go cold'. Therefore, in order to maximise opportunities for immediate feedback, I decided that a conference attended by both environmental practitioners and researchers would constitute the most appropriate medium for communicating my findings at this stage.

Although I was still maintaining research contact with Bury and Bedford, I summarised the main ideas that had emerged from the central study in a paper for the September 1996 Business Strategy and the Environment Conference. As the conference was attached to an established UK environmental management journal, I hoped that it would be attended by a broad range of individuals with at least a passing interest in integrated responses to environmental issues. On the day I was not disappointed, and over thirty delegates chose to listen to my paper, rather than those in the two parallel streams. From the audience's questions it appeared that the conceptualisations of issues, stakeholders and networking were resonant with their own experiences and understanding, and most attention seemed to focus upon how individuals who saw things differently could actually be encouraged to share their insights. In responding to questions in this area I mentioned the Bedfordshire brainstorming session (section 5.3.2.1.1), and I interpreted the audience's reaction as an encouraging sign of interest in the techniques used.

Overall, feedback gathered from the conference appeared consistent with my own reflection upon the Environment Agency and Bury studies. I therefore concluded that the idea of group learning was somewhat under-developed and that creative-thinking potentially held some promise in this area. These ideas were thus carried over into the fourth and final phase of the fieldwork.

6.6 AN ON-GOING 'SOUNDING BOARD'

In the spirit of the processural philosophy of this research, I sought and received on-going feedback on my emerging ideas. This feedback was provided by a group of practitioners whom I had originally encountered through a shared interest in information systems for environmental management. Although contact with this network of practitioners was somewhat sporadic, their contribution was nonetheless valuable. Indeed, a lunch-time meeting involving an environmental consultant and the Corporate Environmental Affairs managers of two of the UK's largest utilities, proved particularly useful in crystallising ideas for the final phase of the fieldwork.

We had come together to advise on the design of an IT and environmental management conference, however, the agenda for our lunch-time discussion was spontaneous and conversation soon focused upon strikingly-similar problems that the two corporate environmental managers were experiencing running meetings that involved different experts, such as plant managers, health and safety officers, lawyers and accountants:

> *"They're there because their expertise is part of the solution, but it also seems to be part of the problem ... They just don't seem to speak the same language ..."*
> (Corporate Environmental Affairs Manager, UK Utility)

The consultant then explained that he had used creative-thinking techniques with a similarly diverse group of experts, for a telecommunications utility, in an attempt to get them to share their understanding about making environmental improvements. The techniques he described were similar to those used for the brainstorming session in the central study; although, interestingly, he had also encouraged the group to consider the most unsustainable solution to its problem - an exercise which he claimed to be enlightening for all concerned. I recounted the brainstorming session I had facilitated, and it became clear that the two corporate environmental managers saw potential in these kind of techniques for facilitating group learning:

> *"I certainly think we need to try something, otherwise it just ends up with people defending their positions and no-one gets anywhere."*
> (Corporate Environmental Affairs Manager, UK Utility)

This impromptu meeting strengthened my recognition of the need to explicate the concept of group learning so that it provided guidance for those wished to encourage it. Furthermore, it reinforced the emerging idea that creative-thinking techniques could play a part in the process of sharing diverse appreciations of environmental problems. These twin themes inspired the fourth, and final, phase of the fieldwork, which is described in the following chapter.

7. EXPERIMENTING WITH 'CREATIVE DIALOGUE'

This chapter will explain how the concept of group learning was developed through the design and facilitation of a series of research encounters. These encounters concern the development of a multi-agency response to the complex issue of air quality management. The chapter emphasises the design and execution of the encounters, using workshop materials and transcripts to provide salient illustration. It concludes by reflecting upon the concept of 'group learning' as it appeared in the fieldwork, suggesting a reformulation in terms of 'creative dialogue', to characterise the endeavour. This process of reflection will be developed further in the following chapter.

7.1 GETTING IN AND GETTING ON

In order to develop the conceptualisation of group learning so that it had meaning for those who wished to promote it in integrated environmental management initiatives, I began looking for an opportunity to bring together a diverse group to consider a complex environmental issue. I hoped that this would allow me to explore and develop techniques for facilitating the process of building shared understanding that earlier fieldwork had identified as critical.

7.1.1 IDENTIFYING APPROPRIATE RESEARCH SETTINGS AND NEGOTIATING ACCESS

Within Bedfordshire County Council preparations were already underway for a pilot workshop that would bring together data and expertise relevant to the issue of traffic and air quality (see section 5.4.2.2). I therefore followed the meetings in which progress was discussed and offered to suggest a structure for the pilot workshop and to facilitate the event when it took place. Mr Kingfisher welcomed the offer and invited me to provide further details. However, whilst considering how to structure such an event, the profile of traffic and air quality in local government was raised dramatically with the Department of the Environment's release for consultation of a draft UK National Air Quality Strategy (NAQS).

The proposed NAQS received considerable press attention, not least for the new responsibilities it proposed for local authorities (BBC, 1996). As a consequence of this, and because of on-going, related research contact (eg. Hadfield and Cannibal, 1996; Hansen, 1996, and Neighbour, 1996), Bedford Borough's Principal Environmental Health Officer (Mr Oak) telephoned Cranfield's IERC suggesting collaboration in Bedford's response to the consultation document. I interpreted this as further impetus for a workshop in which an integrated approach to managing Bedford's air quality could be discussed and therefore faxed a proposal to Mr Oak:

> *"... The emphasis of the workshop will be on learning together - participants will be encouraged to explore assumptions underpinning current positions and strategies, rather than defending them. It is hoped that the workshop will highlight some key messages for national government and elicit some creative suggestions for implementing the [NAQS] that are particularly sensitive to local needs. ..."*
> (Personal communication to Mr Oak, 09/05/96)

In an unplanned encounter with another senior EHO from Bedford Borough, Ms Larch, I explored the strength of support for a NAQS workshop and was encouraged by her response. In all my communications with Borough officers, I mentioned the work that I had been engaged in with the County Council and explained that Mr Kingfisher was already preparing an air quality workshop. Recent research had indicated communication problems between the Borough and the County Councils regarding air quality initiatives (Neighbour, 1996) and Mr Oak alluded to this when he left me a voice-mail confirming that he had received authorisation to develop a multi-agency response to the draft NAQS:

> *"We've got the go ahead ... even to start talking to the County !"*
> (Personal communication from Mr Oak, 12/9/96)

In an attempt to reduce duplication of effort I endeavoured to keep Mr Kingfisher and Mr Oak informed about each other's initiatives, but was surprised to receive two faxes on September 25, 1996, detailing air quality workshops - one from Bedfordshire County Council and one from Bedford Borough ! However, following consultation with the two

proponents, it became clear that there was value in both workshops going ahead as each would have a distinctive emphasis. The Borough-hosted workshop would focus on developing a response to the NAQS and the County-hosted workshop would focus on integrating and exploring available data. Both workshops were interesting from a research perspective and I was fortunate that both proponents considered me suitable for designing and facilitating their events. Furthermore, in getting this far I had gained first-hand experience of "networking". This experience reinforced the central study's conceptualisation of a process that required determination and an acute sense of audience (section 5.4.2.2.4).

With sensitivity to political overtones to the decision about which event should come first, I was relieved when the dilemma was resolved by the availability of those considered essential to invite. Those working on integrating health and air quality data would not be ready until the end of October, so it was decided that the NAQS workshop would be held first.

7.2 NAQS - GETTING ON AND GATHERING DATA

7.2.1 ESTABLISHING AND MAINTAINING AN APPROPRIATE ROLE FOR THE RESEARCHER

Indications had emerged in the central study that sharing understanding was not a natural outcome for meetings involving diverse experts. These indications had subsequently been strengthened through attempts to explore resonance of the ideas of networking and group learning beyond the central study which inspired them. It was becoming increasingly clear that some unusual techniques would be required if meetings of diverse experts were to be productive. I therefore chose to establish and maintain the role of an experienced management consultant in the hope that workshop participants would be more likely to trust any unorthodox techniques that I might introduce to the meeting.

Earlier fieldwork had demonstrated that sustaining a chosen role required constant attention. For the NAQS event I endeavoured to maintain an air of confidence that belied

the novel techniques I was introducing. I exploited every opportunity to reinforce the image of an experienced management consultant, for example by means of attire, by attempting to maintain a relaxed body language, and by emphasising my position as a senior lecturer in a university business school. During interaction with workshop participants I chose to exploit the maxim that familiarity breeds contempt, hoping that by parodying the role of a management consultant, I would demonstrate familiarity and experience:

[Facilitator] What else could we do with a spatula ?

... [various suggestions] ...

[] Run a management course with it ! ... [Laughter]

[Facilitator, as he writes this idea down] Charge <u>huge</u> amounts for a management course with it ! ... [Lots of laughter]

[] So, back to the mental image again of managing when you're being pulled apart - anything else that can help ?

... [various suggestions] ...

[] Employ a management consultant ?! [laughter]

[Facilitator] What's the difference between a management consultant and a vulture ?

[] There isn't !

[] One can fly ? [laughter]

[Facilitator] Vultures don't get air miles ! ... [laughter and some applause]

Whilst the lengths to which I had gone to establish my role may appear extraordinary, conversation with participants after the event reinforced the importance of such efforts to the research process:

[] You can be honest now, you're not really an expert on air quality, are you ? I bet you charge a fortune for using those techniques in business. ..."

Furthermore, this quote reinforces Hammersley and Atkinson's view that actors will fit a researcher into a behavioural model in order to know how to interact with her/him (1983,

pp. 73-75). Indeed, this further supported the decision to highlight the 'role of the researcher' in the guiding framework developed in Chapter 3.

7.2.2 SELECTING RESEARCH ENCOUNTERS

The central study had revealed the critical importance of bringing together insights and expertise appropriate to exploring a complex issue. Furthermore, it demonstrated the importance of having a well-developed sense of audience in order to discern those who might make an effective contribution. Networking offered a mechanism by which a map of relevant individuals could be identified, however the tight deadline by which a response to the NAQS consultation draft was required, precluded a personal study of potential participants. I therefore had to rely on the sense of audience developed by another experienced networker, Bedford Borough's Environmental Development Officer, Ms Ash. She and I liaised regarding both the delegate list and format of the event. In the participatory philosophy of this research we defined the scope of the research encounters together. The delegate list included representatives from transport, environmental, and development departments in the County Council and the Borough Councils in Bedford and its surrounds. Representatives were also invited from the Environment Agency, local transport groups and LA21. In total about twenty individuals were invited to two half-day workshops, organised on consecutive weeks in the centre of Bedford. Although invitations were sent out at short (two weeks) notice, the two workshops benefited from almost full attendance. The following section explains why the event was divided into two sections and details how each section was organised.

7.2.3 EMPLOYING APPROPRIATE RESEARCH INSTRUMENTS

Literature on "organisational learning" had suggested that building shared understanding should be placed at the heart of integrated approaches to environmental management. However, experiences in the field had supported Crance and Draper's (1996) view that simply inviting a group of stakeholders to share their understanding of an environmental issue was no guarantee that the exercise would be productive. Environmental issues are widely-regarded as value-laden (Stead and Stead, 1992; Tribe et al., 1976). Indeed, as Chapter 2 highlighted, differing perceptions of 'relevant facts', conflicting views on the

relative significance of phenomena, and inherent difficulties in conceptualising the temporal and spatial scales deemed necessary for assessing environmental effects, all combine to make shared understanding a less than an assured outcome of normal interpersonal interaction.

Whilst individual appreciations of an issue can embody valuable knowledge, the assumptions on which that knowledge is founded are rarely exposed for scrutiny by others (Argyris, 1993). In other words, a particular "way of seeing" is normally taken for granted (Morgan, 1986). Argyris (1993) further suggests that in group situations, the natural tendency of individuals gravitates towards defending rather than exploring their positions on issues being discussed. As this contention had been supported by experiences in the field, I concluded that for stakeholder-representatives to learn from each other's perspectives, defending without questioning an individual position would have to be discouraged as a behavioural norm. This climate for group learning, which Senge (1990) describes as a "spirit of inquiry", inspired the design of the NAQS workshops (and the data integration workshop that followed).

From a thesis development perspective the workshops needed to provide insights on an interpersonal level regarding the concept of group learning. The fine detail this implied had a strong influence on my decision to tape-record and transcribe the workshops. I also chose to use a strategy of investigator-triangulation (Denzin, 1970) to inform the process of interpreting the proceedings. I was therefore accompanied by two Cranfield IERC colleagues who took their own record of the event. The description that follows is thus based on a triangulation of material produced in the course of the event, tape-recordings, notes from fellow researchers and my own recollection of the event.

I decided that the NAQS event could be usefully divided into two workshops as this would allow each to adopt a distinct emphasis, and allow for reflection and responsive planning in between. Following Rickards' (1990) observations about different techniques suiting periods of divergent and convergent activity, I decided that the aim of the first workshop would be to build shared understanding of diverse perceptions of the issue of air quality held by participants. The ambitious aim of the second workshop would be to

build shared understanding of how to move forward in developing a local response to the NAQS. I confirmed the suitability of a two-stage process with Ms Ash and later made a point of communicating the overall structure of the event to participants at intervals throughout the proceedings. Indeed, participants were invited to judge the success, or otherwise, of the event in those terms.

7.2.3.1 THE FIRST WORKSHOP

Having decided on a coarse structure for the event, I then adapted and adopted techniques that I hoped would provide the necessary fine detail. For the first workshop, I drew on Gordon (1961), Rickards (1990) and Senge (1990) to create the following programme of activities for the two-and-a-half hour session:

- Ritual signing-in
- Warm-up
- Framing the problems (as goal-oriented statements)
- Clustering, prioritising & selecting focal problems
- Brainstorming solutions & metaphor

I hoped that through this series of activities I could foster an appropriate "spirit of inquiry". Reflection upon the extent to which that was achieved can be found later, however my efforts to shape the first workshop are now described.

> "We have a ... goal. This is to be together as colleagues, leaving all our roles and positions at the door" (Senge, 1990, p. 261)

Following Senge's (1990) account of an invitation to a similar kind of session, I arranged for a flip-chart to be placed by the entrance to the workshop room, and encouraged participants to sign in. Without prompting, the first participant wrote his name and organisational position on the flip-chart, and the others followed his lead. (I had hoped that organisational positions would be supplied without prompting, but I had been prepared to encourage their articulation by adding titles - name and position - to the flip-

chart.) As I wished to encourage group learning that was not bounded by organisational roles, I made the following reference to the signing-in ritual in my introduction:

> *[Facilitator] "... We've all got things to bring to this debate ... But one of the key things in writing down your name and position over there [motions towards the flip-chart by the entrance] was symbolically leaving your position on that piece of paper and just bringing your experience and insight into today's debate ..."*

This message was reinforced through a warm-up activity that was designed to act as an 'ice-breaker' but also served to establish desired behavioural norms in a light atmosphere. By inviting participants to suggest uses to which a wooden spatula could be put, I was able to introduce the rules of brainstorming in a neutral arena. I thus made a point of encouraging creative behaviour and actively discouraged judgmental or defensive behaviour by drawing attention to it in a firm, but light-hearted manner:

> *[] Use it in scrabble ...*
>
> *[] The mind boggles !*
>
> *[] How would you use it in scrabble ?*
>
> *[] Scrabble or scramble ?*
>
> *[Faciliator] One of the principles of brainstorming is that we don't make any judgements on the idea ... [loud laughter]"*

I hoped that by establishing a "spirit of creative inquiry" in a deliberately irrelevant context, I could then encourage the group to maintain this atmosphere when attention turned to the issue of air quality, and things became more personal. I used a break for coffee to herald the main business of the day, which I opened with an invitation to participants to use Rickards' (1990) goal-oriented statements to frame the particular problems they saw within the issue of air quality:

> *[Facilitator] ... We're all bringing different perspectives to this issue ... and we all see different problems, and what I want to try and capture with this next technique is just*

the problems that people see with the air quality issue - what are the particular problems for you ?

Over one hundred goal-oriented problem statements were then captured and recorded on flip-charts so that they remained visible to participants throughout the session. As this activity involved the whole group, with individuals shouting out particular problems as they saw them, participants were then invited to review the problem-statements in silence and to cluster them. Following a pyramid-like structure, participants were then encouraged to compare their efforts with an ever-widening group of neighbours until the group as a whole had been involved in debating key clusters. I then recorded the group's synthesis of problem-clusters on flip-chart paper:

How to empower the public ?
How to establish risk and know what to do about it ?
How to target our efforts on air quality ?
How to manage when you're being pulled in different directions ?"

The group was invited to suggest which of the problem-clusters they would prefer to tackle first. This proved more difficult that I had anticipated when preparing the session, as a debate began to form around the word risk. Whilst this debate began to raise interesting issues about differing perceptions of risk - for instance between experts and the public (c.f. Smith and Elliot, 1992; and Wynne, 1994) - I realised that the earlier "spirit of inquiry" was beginning to evaporate. Premature evaluation of ideas was creeping in and Rickards' (1990) 'yes, but ...' "ideas-killers" were increasingly common:

[Facilitator] Well if we use the technique just to get all the ideas out into the open then perhaps, when we go away after the session, we can actually look into the feasibility of doing those things ...
[] But if you ask the person in the street ... if air quality in their area should pose a risk to their health they will say no. They will say no, there shouldn't be any risk ... because they don't understand the concept of risk ...

I therefore endeavoured to bring the group back to selecting one of the four problem-clusters for a brainstorming exercise. With the help of constant interventions, a specific cluster - *How to target our efforts on air quality* - emerged as having most support and creative suggestions were then invited on how the problem might be tackled. Some suggestions were forthcoming but many contributions concentrated on articulating the problem in greater detail. I therefore decided to invite suggestions on a metaphor for the problem at hand. In so doing, I hoped to lift the problem into an arena where participants might be more able to contribute creative suggestions as to how the likeness of the original conundrum could be tackled (Gordon, 1961; Rickards, 1990).

> "... a good descriptive metaphor has a quality of 'mystery' about it as it postulates similarities between apparently unlike things, and as it illuminates and excites in the 'confusion' of our impressions by simultaneously suggesting an identity (a similarity) and a separateness (a dissimilarity)." (Gordon, 1961, pp. 114)

This technique had proved successful in earlier fieldwork (section 5.3.2.1.1), and it did not disappoint either myself or, as feedback subsequently indicated, the participants. Indeed, the following extract demonstrates how one idea frequently sparked another as participants appeared to oscillate, in Gordon's "confusion", between the problem-at-hand and its metaphor:

> *[Facilitator] It's now when we come to the difficult bit. This is where we've got to pull all these things together and the air quality problem at the moment is pulling us apart ... we might be able to use some techniques to bring us back together a little bit ... can you give me an image of what it's like ... an image of targeting ? ...*
>
> *[] First of all you define what you want to aim at, then you sight up - so you'll have a method of sighting won't you ? Then you allow for various distractions such as wind and gravity and such things ... And, you've actually got to want to fire in the first place ...*
>
> *[] You need communication with the target [to know if you've hit or missed] ...*
>
> *[] Is there something in this for the target ? ...*
>
> *[] Are we talking about a bang or a bar of gold ? ...*

[] It's got to be like a biological weapon so that the effects spread

[] Shrapnel ?

[] What about something that's constructive rather than destructive ...

[] Do I need to keep firing this thing ? ... or does it have a knock-on effect that's self perpetuating

[] You need to soften 'em up as well, you need to ...

[] Propaganda ?

[] If we changed biological weapons to biological infection, then we can talk about infecting populations with a good idea ...

[] I can see some mileage there

[] You're getting close to the true model because, in fact, the danger with some of this stuff is the idea that you can fire a missile onto a target that's conveniently sitting there waiting to be hit and that's it really ... because our problem is people really isn't it, and their behaviour ? ...

[] Aha ... their resistance builds up !

Following an earlier conversation with an environmental consultant (section 6.6), I also experimented with brainstorming the antithesis of a solution. This proved enlightening. Participants' suggestions on how to ensure that efforts to hit the target would be unsuccessful, revealed perceptions of how change could, and could not, be delivered:

[] ... Seek sponsorship [laughter]

[] Keep talking about it and do nothing [laughter]

[] Wait for somebody else to do it ...

[] Wait for the target to die of other causes [loud laughter] ...

[] Wait for the government to do something about it ...

[] Attend seminars on spatulas [laughter] ...

[] Be politically sensitive ...

[] Try to please everybody

[] Allocate blame ...

I then invited the group to "*turn these ideas around*" and bring them, and the earlier creative suggestions on the metaphor of targeting a weapon, back to the problem of targeting efforts on air quality. By encouraging the group to set up a tenuous point of contact between unlike things, my hope was that:

> "... if the metaphor works, this apparently tenuous point becomes a pivot upon which the two realms of the unlike swing towards a momentary coalescence ..."
> (Gordon, 1961, p. 106)

In this "momentary coalescence", I hoped that novel suggestions would be forthcoming on how to target the group's efforts on air quality. For instance, an idea about choosing an appropriate missile was transformed into a suggestion about making sure an appropriate language was used for getting messages across. Also, the analogy drawn between behavioural change and biological infection, highlighted how continued exposure to the same message could build up resistance amongst a target population. This sparked a suggestion about ensuring that messages to the public '*mutated*' sufficiently to combat growing resilience. Further suggestions were forthcoming and participants' comments suggested that the session was proving useful:

> *[] ... [The meeting]'s sort of improved on the beginning when I thought 'Oh God it's like being with a load of social workers' ... [laughter] ..."*

However, as little time remained in the session I decided to invite the group to contemplate one other problem that was generally considered pressing. I also took the opportunity to reinforce the philosophy of the first workshop:

> *[Facilitator] The whole point of this session ... is that we get some of our concerns out into the open, and some ideas out too. We can't turn them into ... 'do by Mondays' in this session today ... [N]ext week I'll use some different techniques ... but I hope we've got some of the key concerns across the boards [motions towards the wall covered in flip-chart sheets] in terms of the problems we see and we've captured some good*

ideas, so it might be time to move from 'targeting' to 'How to manage when you're being pulled in different directions' ...

As I had encouraged some participants to postpone their frustration about trying to satisfy what they considered to be conflicting goals, I anticipated that I would have to work hard to maintain the "spirit of inquiry". I therefore encouraged the group to focus upon an image of the problem, rather than its everyday manifestation. Some participants, however, felt impelled to articulate the problem at hand in terms likely to provoke defensive behaviour:

[] Can I give you an example that's in my mind to tell you how difficult this is ? ... the government produces its PPG on sustainability which says basically what you really need to do is to concentrate development near to existing transport corridors; so the County Council picked this one up, produced a structure plan and hey-presto we've now got new development coalesced along certain roads. If there is a better way of ensuring that air quality worsens where people are living then I can't think of a better way of doing it ...

[Facilitator] Well, can we actually ...

[] Well, we've got a dichotomy haven't we ...

[Mr Oak] That's on the basis of current assumptions. If we change technology, the problem doesn't exist any more ...

The above extract demonstrates that by now in the workshop some participants had also assumed responsibility for maintaining the "spirit of inquiry". Here, having seen my intervention to be ineffective, a Borough participant stepped in to put the dialogue back on track. Furthermore, County Council participants were not provoked into defending their actions. Whilst encouraged that I was not alone in seeking to maintain a "spirit of inquiry", I was conscious that the way I handled those who challenged my intended norms would send messages to the group as a whole. Despite my frustration I wanted the way I handled the workshop to be consistent. Earlier I had suggested that unquestioning mind-sets could be changed, therefore I wished to avoid using my position as facilitator simply to silence those exhibiting fixed mind-sets, as this might suggest that such

behaviour could not be changed. This dilemma will be explored further in Chapter 8, however, it is important to note it here as it had a significant impact upon my interventions as workshop facilitator.

As with the metaphor of targeting a weapon, imagery was used to generate suggestions for the problem of managing under conflicting goals:

> *[Facilitator] ... coming back to the mental picture of being pulled in two different directions, any other ways you can think of coping ?*
>
> *[] Decide to go one way or the other ...*
>
> *[] Toss a coin*
>
> *[] Review your resources*
>
> *[] I thought the idea of coin tossing was a good one. In other words, use something that's not involved to help you decide - so, a third party for instance*

As time ran out for the first session I invited participants to consider the idea of "stakeholders in Bedfordshire air quality efforts" in time for the following session:

> *[Facilitator] ... list the critical stakeholders. ... next week I'd like us to start thinking about what we can actually do with each one of those critical players. ... because that's the essence of our response to the strategy ...*
>
> *[] So, is that our homework then ? [laughter]*
>
> *[Facilitator] Yes ! ... It's very difficult to sustain this creativity and fantastic idea generation much longer than we have, so that's not a bad point to stop. We probably know who the players involved are, but we need to start thinking about how on earth we're going to approach them, what our game should be and what the rules are - and that's the sort of thing we could each individually take away, have a go at, and bring back to the meeting next week as a way forward. Is that agreeable to all those who're coming ?*
>
> *[Several participants] Yes*

I then left the room so that a Cranfield colleague could organise an evaluation of the workshop. This was based on each participant anonymously identifying two positive and two negative comments about the process. Analysis of these comments indicated two major positive clusters. First, participants felt that the session had used effective methods for getting salient ideas into the open. Indeed, the enhanced awareness of other people's positions that the session had produced was particularly welcomed:

"Good methods used for getting people's ideas out"

"Good way of opinion sharing and ensuring involvement of individuals"

"Quickly demonstrated the wide range of relevant aspects"

"Good range of views/perspectives"

"Ideas very interesting for all disciplines"

"Process identified breadth of problem"

Second, the techniques had avoided normal barriers to issue-exploration:

"Interactive, non-judgemental, stimulating & free-ranging exploration of the issue"

"Brainstorming techniques allowed enormous generation of ideas, theories, etc without going ... down the same old routes"

"No constraints"

"Style of seminar prevented individuals holding the floor"

Negative clusters surrounded the size of the group and opportunities for developing ideas in depth. However, the group's main concern was how diversity revealed in the session would lead to consensus on a way forward in the next workshop:

"A lot of inputs may not lead to useful outputs within practical timescales"

"No basis at end of session one for writing response to NAQS draft (required by Friday 25th !)

"Fiddling while Rome burned !"

"I'm not at all convinced that such a plethora of ideas will actually help with the response to the UK NAQS"

One participant also raised an issue that will be returned to in later chapters:

> *"After two meetings the group energy / social bonding experience will not have an ongoing focus"*

In the intervening period before the next workshop, miniaturised copies of the flip-charts produced in the session were faxed to participants (see appendix 13.3, p. 377), along with a reminder of "*homework*" concerning how the NAQS could be improved and who the key stakeholders in Bedfordshire's air quality were considered to be.

7.2.3.2 THE SECOND WORKSHOP

Techniques for the second workshop were chosen to satisfy two main aims: to collate suggestions on the NAQS document, and to build consensus on ways to work together to improve air quality. As the first aim was reasonably clear-cut, a coffee break was used to mark the end of an episode designed to fulfil it, and to signal the start of activities designed to fulfil the second aim. The coarse structure of the workshop was thus:

- Collate suggestions on NAQS
- Identify 'points of leverage'
- Review resources
- Define projects to illustrate a way forward

I followed a brainstorming approach to collect suggestions for improving the NAQS consultation document. However, as Lemon (1991) had observed, informants often considered causal factors that lay well outside the boundary that had been adopted as the focus of the encounter. As contributions were so wide-ranging, I tried to keep the meeting focused upon critiquing the document itself. In the debate that ensued, a broad consensus appeared to surround the belief that the document could only have meaning in the context of a national, integrated transport policy. Furthermore, greater clarification was called for on the role of health professionals in highlighting and dealing with the consequences of poor air quality. A suggestion about developing a national mechanism

for pooling experience of air quality management initiatives also gained widespread support. A major set of concerns appeared to surround how air quality would be monitored. This cluster had three key dimensions: appropriateness of the choice of determinants; the significance of peak, rather than average levels; and the question of resources to support either increased monitoring, or the use of models that would help to fill gaps in current coverage. Indeed, this final point about resourcing air quality management came through as the group's dominant concern with the consultation draft. Participants agreed that the document should indicate where the necessary resources to implement the strategy should come from. However, this belief was tempered by the fatalism that, with a general election looming, radical proposals for resource-allocation, such as increased vehicle taxes, were unlikely to be included.

As consideration of the consultation draft had sensitised participants to the difficulties that they were likely to encounter in implementing a NAQS, I was conscious that a feeling of hopelessness might dampen ideas generation. I therefore decided to tackle head-on the "I can't make a difference" problem, highlighted in the Bury study (section 6.4). In order to achieve this, I introduced Senge's (1990) notion of "leverage", wherein a deep knowledge of pertinent processes is used to identify small interventions that have a large desired effect. Following Senge's analogy of a trim-tab on the rudder of a large ship (1990, pp. 64-65), I emphasised that interventions may sometimes appear to be counter-intuitive. I then invited participants to divide randomly into two groups to consider which of the one hundred air quality problems that had been identified in the previous session, could benefit from a small local action. In so doing, I deliberately emphasised the importance of working with participants from other agencies and departments:

> *[Facilitator] We're all from different perspectives. We've all got something to bring to this debate. Let's see if we can mix and match and work with some of the other agencies involved and see if together we can identify where to make a small action that's going to have the biggest effect on this air quality issue ...*

Following Fielding's (1993a) observations about the value of printed stimuli to the research process, I had printed the problem-statements from the previous workshop on

cards as I hoped that this would enable them to be physically-grouped or clustered in a way that would be visible to all. To prompt the process of learning from one another, I invited participants to reach an informed consensus about whether each problem-statement was amenable to leverage, not amenable to leverage, or possibly amenable to leverage. To achieve this I encouraged each group to order the cards into YES, NO, and MAYBE piles:

> *[Facilitator] ... you lot do know something about the processes involved - that's the knowledge that I'm trying to get out. So, if you're sitting around that table and you think it should be a Maybe rather than a No, try and explain your reasoning to the other people. That's the spirit of working together that I would like us to try and develop in this next session ...*

I allowed over half-an-hour for the activity which was characterised by intense group activity and, on the whole, individuals appeared to explain their decisions about positioning cards as a matter of routine. I then invited a spokesperson from each group to reflect upon their group's deliberations. A consensus was evident between the two groups regarding the potential of legislation and education as levers:

> *[] We came to that conclusion as well, that education was a lever !*

The metaphor of a lever prompted one group to comment that some levers were easy to pull but were ineffective. This comment received support from the spokesperson of the other group, who observed that much of what was being done on air quality was unfortunately in that category. Conscious of not losing the enthusiasm and idea-sharing that had characterised the small-group exercise, I explained that the workshop would conclude by each group proposing projects that would illustrate a desired way forward. However, in order that these deliberations could benefit from the knowledge of the whole group, I invited suggestions on local resources that such projects could exploit:

[Facilitator] ... the expertise necessary to make those ideas work is gathered around here at the moment. But, before we move onto projects could you just remind me about what resources we have at the moment to tap into ? ...

This exercise was disrupted by a participant who preferred to articulate his individual position on the problems facing local air quality management initiatives - reflection on this appears later, in section 8.1 - however, with the help of other participants, the group returned to drawing up a list of resources that could be utilised. After a wide range of potential resources had been listed, I then invited the workshop to re-form into the two groups (from before) in order to devise a soft-systems root definition for a project that would illustrate a desired way forward. Although time did not permit a full CATWOE analysis (see **Table 5-1**, p. 150), each group was invited to identify important stakeholders and the agencies that would assume a lead role in coordinating the project. One group provided two definitions; the other group concentrated on developing one in more detail:

A project coordinated by the licensing section of the local authority
to achieve an increased frequency of emissions testing for taxis and private-hire vehicles
by means of imposing licence conditions
in order to improve air quality in town centres (taxi ranks and elsewhere)

A project coordinated by the green business network
to achieve a reduction in fuel use
by means of encouraging business to consider flexible working arrangements
in order to reduce the need to travel

A project to launch a community transport scheme which could be a model for others
by means of community participation and design, monitoring and review, and providing information, eg. through schools initiatives, cycle schemes, bus company cooperation, and voluntary speed limits

in order to improve local air quality, quality of life, to address resource consumption and to promote local ownership for local action
coordinated by LA21 in Goldington
involving local authority, community, voluntary groups, police, businesses, bus companies, schools, LA21, universities and the press
within a timescale of being up and running in 12 months with regular reviews and further targets to be set

I concluded the session by highlighting how the group had moved a long way towards meeting the ambitious aim set out at the start of the first workshop. I drew attention to the spirit of creativity and inter-agency collaboration that had emerged and emphasised that this needed to continue. To reinforce the point, I presented each participant with a small folded paper T-shirt which carried the words "*Working together to improve Air Quality*". I hoped that this unusual 'gift' would be memorable and, joking that participants had "*done the workshop and even got the T-shirt*", I explained that these tokens were designed to reinforce the message that the work of coordinating effort on Bedford's air quality had only just begun. To demonstrate this, the space for a contact number on the T-shirts had been deliberately left blank and I urged participants not to throw the T-shirt away before it had been filled in.

A buffet lunch after the workshop provided an opportunity for me, and the other Cranfield researchers, to elicit further feedback on participants' experience of the event as a whole. Most (myself included !) seemed impressed that the aim of identifying desirable and feasible ways forward had been met. This seemed particularly impressive as it had been widely regarded as unachievable at the end of the first workshop. Many saw value in the techniques used, and a number of participants asked for further details:

"It was really good to avoid going down the usual rat-runs"
"I'm sure I could use some of those ideas in Local Agenda 21 meetings ..."

Indeed, I noticed that a group of participants had chosen to use metaphor to continue their analysis of the issues over lunch, exploring the influence of a sense of crisis by questioning why technological development was so rapid in war time.

My involvement with the event concluded with the circulation of miniaturised versions of the flip-chart sheets to all participants (see appendix 13.4, p. 380), and the provision of transcripts of the two workshops to the team responsible for drafting Bedford's inter-agency response to the Department of the Environment.

7.3 AIR QUALITY DATA INTEGRATION - GETTING ON AND GATHERING DATA

The preceding sections have characterised the improvisational nature of workshop facilitation with a rich, interwoven description of design and delivery; the following account will not repeat this. Instead, the section will emphasise the different design features of this workshop. As the improvisational nature of facilitation was a common feature, the following account separates workshop preparations from a synthesis of the workshop outcomes in order to illustrate structural differences from the NAQS event.

7.3.1 ESTABLISHING AND MAINTAINING AN APPROPRIATE ROLE FOR THE RESEARCHER

When contemplating the role I would adopt for this final piece of fieldwork, I was sensitive to differences between the NAQS event and the data integration workshop. In the former, I had emphasised my role as a management consultant in order to encourage the large group of participants to work with, rather than challenge, the unusual process of the meetings. However, with regard to the latter, many of those invited to the data integration workshop had been actively engaged in preparing the data that would provide the focus of discussion; they were thus acutely aware of the experimental nature of the session. Furthermore, the foundation of my relationship with the workshop organiser, Mr Kingfisher, was based on openness and a willingness to learn about the issues together (section 5.2.3). I therefore, decided that it would be inappropriate to under-emphasise my

role as a PhD student, as I had in the NAQS workshops. In the participative spirit of thesis development, I elected to make clear to all participants that I too was attempting to contribute to the workshop, although my contribution would take the form of process organisation, rather than data and expertise. I also engaged in conversation with Mr Kingfisher regarding the structure and techniques that I would use. In so doing, I maintained a role of someone actively seeking to learn about the process of integrating insights about complex issues (in this case interplay between traffic, air quality and health in Bedfordshire) through both my front-stage and back-stage performances (Buchanan and Boddy, 1992; Strauss and Corbin, 1990).

As impetus for the workshop had arisen from data integration project meetings in which I had participated in the central study, it was helpful to conceptualise the workshop encounter as action-research (Susman and Evered, 1978). Consequently, my role of someone actively seeking to learn could be equated with that of an action-researcher - a conceptualisation congruent with Mr Kingfisher's view of my involvement:

> *"... Mark helped us a lot in developing what we thought we really wanted to do with the process of investigating complex issues ..."*
> (Mr Kingfisher, Data Integration Workshop, 31/10/96)

Viewing the data integration workshop as action-research from the central study was wholly consistent with the role I had chosen to emphasise. Whilst implications of this perspective will be considered in greater depth in later chapters, it is nonetheless important to note here that, although I had not sought his support in establishing my role, Mr Kingfisher's introductory address to the workshop helped to reinforce participants' perceptions of me as a participative researcher, a reflexive process facilitator.

7.3.2 SELECTING RESEARCH ENCOUNTERS

As a consequence of my involvement with, and similar to the preparations for, the NAQS workshops, I had to rely on someone else's networking experience to identify those best suited to attend the workshop. However, as I had been involved in detailed discussions

about who might attend such a workshop in the central study, I felt confident that Mr Kingfisher's selection of participants would be informed by a well-developed sense of audience, and would thus lead to significant variety in pertinent perspectives being represented. Furthermore, the workshop only constituted the front-stage performance of the data integration exercise; Mr Kingfisher had been actively engaged in back-stage networking in the months since a pilot air quality workshop was first suggested in the central study. Unlike the NAQS workshop, this workshop involved bringing together pertinent stakeholder resources in the form of representations as well as representatives. In other words, Mr Kingfisher had negotiated with pertinent gatekeepers to gain access to key data sets and then used the County Council's information system resources, particularly its GIS, to provide a graphical illustration of spatial distributions within these data. These representations were then brought to the workshop to provide a focus for dialogue between invited experts, the stakeholder representatives.

Insight into back-stage preparations for the workshop was gained through regular conversation with Mr Kingfisher. These encounters also provided an opportunity to discuss the structure of the workshop itself. Research encounters for this final piece of fieldwork were thus not limited to the data integration workshop itself. Encounters with Mr Kingfisher before and after the workshop, enabled the process of preparing for and reflecting upon the workshop to be explored. Indeed, this broader encounter strategy, and the central study that had preceded it, ensured that the focal (workshop) encounter gained meaning from the context in which it occurred.

7.3.3 EMPLOYING APPROPRIATE RESEARCH INSTRUMENTS

Guided conversation (section 4.5.2) was used to gather insights on the process of preparing for and reflecting upon the workshop. However, in order to make best use of the limited time available for the workshop itself, a more structured approach for guiding group interaction within it was considered necessary. When the data integration workshop had first been envisaged, its aim had been expressed in terms of exploring linkages between traffic, air quality and health, and in terms of learning about ways in which relevant agencies could share pertinent insights and expertise. This aim of diverse

stakeholders managing to learn about the complex nature of the issue (as a precondition for them learning to manage those issues) had been strengthened during preparations for the workshop. Indeed, the draft NAQS and the workshops in which its local implications had been discussed, had played a key role in emphasising the importance of inter-agency responses based on shared understanding of the issues. I thus reached the conclusion that the workshop would need to establish and sustain, through appropriate tools and techniques, a "spirit of inquiry" (Senge 1990). To gain feedback on my conclusion, I provided Mr Kingfisher with a two-page illustrative extract from Senge's text on organisational learning (1990, pp. 260-261). As the invitation to the workshop - subsequently drafted by Mr Kingfisher - echoed Senge's text almost word-for-word, I interpreted congruence between my vision of the workshop and Mr Kingfisher's:

> *... Finally, a few ground rules (borrowed from DataQuest [Senge's example]):*
>
> - *Open Minds. We need to avoid the workshop being dominated by the defence of pre-existing positions so we must all come with open minds and be prepared to examine our underlying assumptions.*
> - *Acting as Colleagues. We need to leave our positions at the door although we will of course know who is who and recognise particular expertises. Our facilitator will keep us on track.*
> - *Spirit of Inquiry. We need to explore the thinking behind our views and assumptions so be prepared to ask and be asked 'Why do you say that ?' ...*
>
> (Extract from invitation to Traffic, Air Quality and Health Workshop)

Having established that my vision of the workshop accorded with the organiser's, I then designed a template for activities which I hoped would realise that vision. First, to provide a common basis for exploring the issues together, a number of relevant journal and newspaper articles were identified by Mr Kingfisher and distributed to all participants:

> *Where did all the fresh air go ? (Independent on Sunday)*
>
> *Extract from Sustainable Development and Health (Public Health Alliance)*
>
> *The Bare Bones of an Air Quality Strategy (ENDS Report 240)*

Government's Air Quality Strategy puts Transport on the Spot (ENDS Report 257)

Air Pollution and Health (Environment Business)

Air Pollution Meets the Health of the Nation (Environment Business)

Breathing can be Bad for You (Environment Business)

War on the Roads (Environment Business)

The Association between Health and Residential Traffic Densities (World Transport Policy and Practice)

Pulling Together in London (Air Health Strategy)

Matching GP Consultations, Asthma Symptoms and Air Pollution (Air Health Strategy)

No Link with Traffic Proxies (Air Health Strategy)

Second, I provided a series of ten-minute presentation slots within the workshop schedule so that participants who were contributing issue-representations, in the form of data sets and analyses, could present their material and reflect upon the process involved in its collation. In order to develop the atmosphere of group learning, I decided that participants who were not providing (re)presentations, would be invited to record what they considered to be pertinent factors for understanding the complex nature of the issues, in terms of both causes and effects. In so doing, I hoped to create an audience for each presentation that would be listening carefully and synthesising material pertinent to a shared understanding of complexity. To bring this shared understanding out into the open, I planned to draw on the experience of non-judgemental brainstorming (section 5.3.2.1.1) to compile a flip-chart list of key factors, and then, once the list was complete, to invite participants to explain the rationale for any factor that was queried. In moving to this second stage, I anticipated that I might need to make increased interventions as facilitator to maintain a positive climate for learning - this, however, did not prove to be the case.

Once a shared understanding of critical factors had emerged, I considered that the next stage for the workshop would be to share understanding of the processes at work. I therefore undertook a review of tools and techniques which could be used to structure participants' exploration of pertinent dynamics and linkages. Checkland's soft systems

methodology was rejected as its strengths appeared to lie in promoting systemic debate regarding the gap between participants' views of a desirable future and the realities they currently perceive (Patching, 1992); it was thus considered more suited to contemplating interventions than revealing pertinent dynamics. Eden et al.'s work on cognitive mapping (Ackermann et al., 1991; Eden, 1988; Swan, 1995) appeared more promising. Its emphasis on debating perceived causal links between key concepts, and the option of computerised support for facilitating the technique in group situations made it particularly attractive (Swan, 1995). Senge's (1990) catalogue of system-archetypes also had attractions, particularly in terms of encouraging participants to consider underlying dynamics and the, sometimes "perverse" (Giddens, 1984), ways in which key concepts and concerns might be interlinked. However, I was concerned that tools or techniques which required substantial explanation would be counterproductive; valuable time would be wasted introducing rather than using the tools. For this reason I found Lemon's (1991) pathways model to offer the most appealing basis for exploring pertinent dynamics (Figure 7-1).

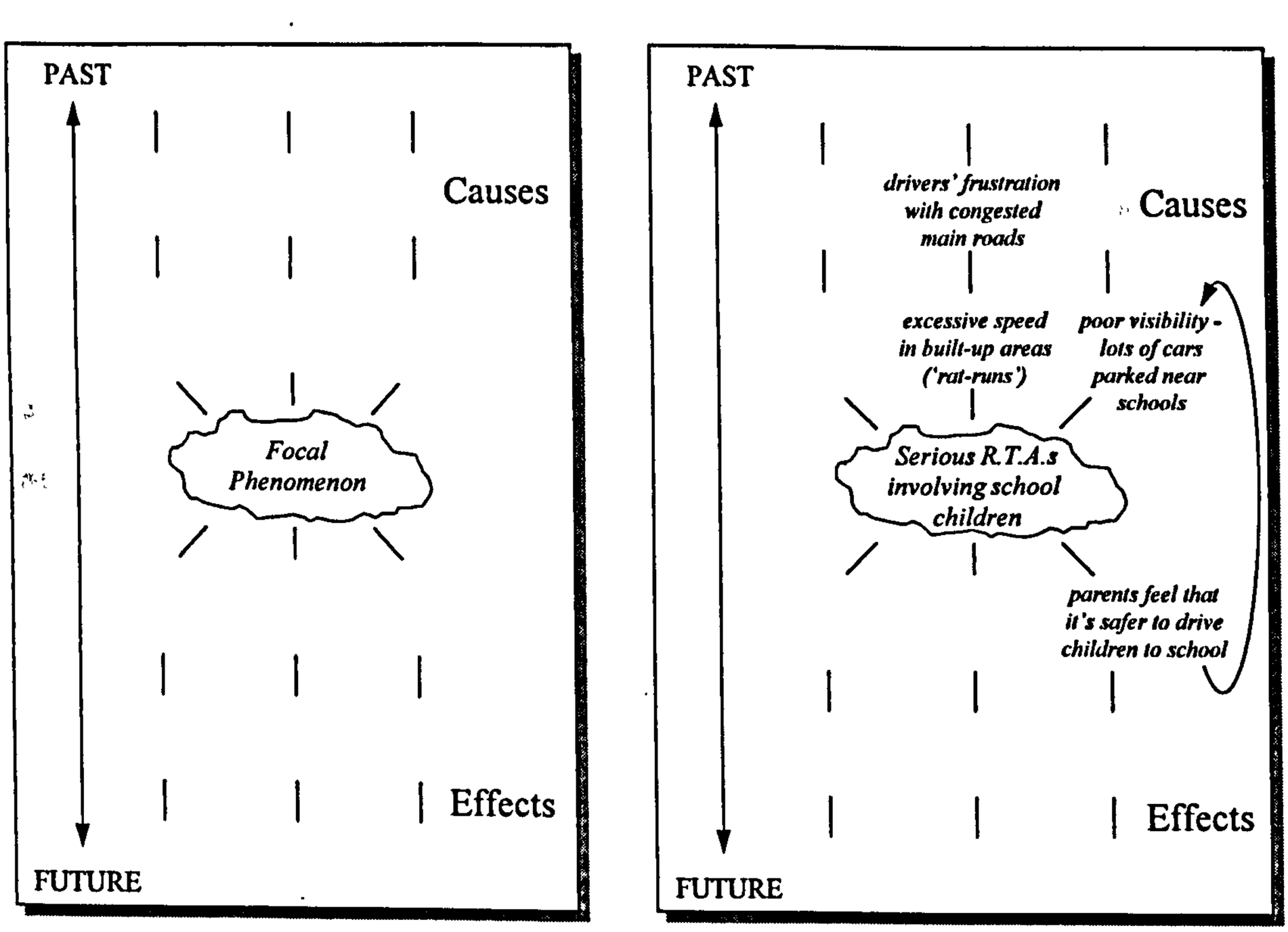

Figure 7-1 Blank & partially-completed pathways templates (after Lemon 1991)

Although the pathways device had not been developed for group situations, it had required little explanation to be self-administered (Lemon, 1991). Designed to reveal informants' perceptions of processes that might run across time, space and theme, it was issue-driven and had proved effective in revealing diversity in users' interpretations of environmental change (Lemon and Longhurst, 1996). In contemplating how the model might be used to promote group learning, I realised that modifications would be required to the process by which it was administered, and opportunities for reflection and debate would need to be provided once participants had completed their pathways models. Rather than providing minimal introduction, so that informants used diverse terminology for describing pertinent pathways, the previous group exercise of compiling a list of key factors provided participants with a common language with which to describe pertinent pathways. I therefore decided that the group would select three problematic phenomena and then, individually, each participant would complete a pathways template that explored the causes and consequences for each phenomena. Once these were complete, participants would then be encouraged to compare and contrast their pathways with a widening set of neighbours until the whole group was involved in the process of comparison and reflection. I hoped that the common language, established in the previous exercise, would enable participants to use the time available to discuss the assumptions underpinning their pathways models, rather than to explain individual terminology. Although the instrument's original, un-guided, delivery allowed for the nuances of individual expression (which could then be analysed away from the field), the ease and immediacy with which individual pathways could be interpreted, and hence explored, by the group, was considered an over-riding priority for deploying the instrument in the context of the workshop.

I also decided that a further modification was required to the way in which the instrument was introduced so that participants would be prompted to consider patterns of mutual causality. Many authors draw attention to patterns of mutual causality when considering complex phenomena - for instance, Morgan (1986), or Senge's (1990) system-archetypes - and it had featured in informants accounts of pertinent processes in earlier fieldwork (see, for instance, section 6.4). I therefore considered it appropriate to encourage participants to consider such patterns when contemplating processes at work. To achieve

this, I developed an illustrative, partially-completed pathways model for an un-related phenomena - road traffic accidents involving children (see Figure 7-1). This model included a reinforcing cycle through which phenomena were reproduced. I hoped that this would encourage participants to consider such cycles within their own pathways models, and I was prepared to develop the idea when participants compared and contrasted their models as a group activity.

To provide a focus for comparing and contrasting models I planned to copy the list of key factors onto cards, so that participants could position these physically in the middle of the table to produce a group pathways model. I hoped to encourage participants to explain the rationale for positioning each card, in order to promote sharing of tacit knowledge. In performing this group exercise I hoped to capture the spirit of Kim's learning laboratory:

> "The spirit of the learning lab is one of active experimentation and inquiry where everyone participates in surfacing and testing each other's mental models. Through this process, a shared understanding of ... key assumptions and interrelationships emerges." (Kim, 1993, p. 48)

Once a group model had been produced, I planned to encourage participants to map the responsibilities and data resources of key agencies using different coloured pens. This would link the pathways exercise to the final exercise of the workshop.

As a fourth and final exercise, I decided that it would be important to encourage participants to share their experience on how these complex issues were being dealt with and to share ideas on how such issues might be dealt with in the future. I hoped that this exercise would enable the workshop to finish on a positive note, and would leave participants considering appropriate actions for the immediate future.

In short, the four stage template developed for the workshop was as follows:

- Background research materials to be circulated in advance to broaden awareness;
- Pertinent data sets to be presented to help the group compile a list of key factors;

- Individual models of pertinent pathways for three key phenomena to be surfaced and compared to promote group learning; and
- Experience of pertinent initiatives to be shared to raise awareness of possible interventions.

7.3.4 ON THE DAY

On the day, the fixed layout of the room prevented the group from physically building a synthesised pathways model; however, a flip-chart-based approach for capturing shared understanding of critical dynamics was improvised. Also, to allow more time for comparing pathways, two, rather than three, focal phenomena were chosen for pathways analysis. These focal phenomena were respiratory hospitalisations and traffic density. With the exception of these two modifications, the template for the workshop was followed closely and, like the earlier NAQS workshops, I endeavoured, as facilitator, to maintain a "spirit of inquiry" throughout.

Key outcomes from the process are now summarised. These are reconstructed from triangulating a transcript of the proceedings, with materials produced by participants and flip-charts that I produced as facilitator. This summary is driven by Figure 7-2, a composite pathways model, synthesised from the participants' diagrams and comments:

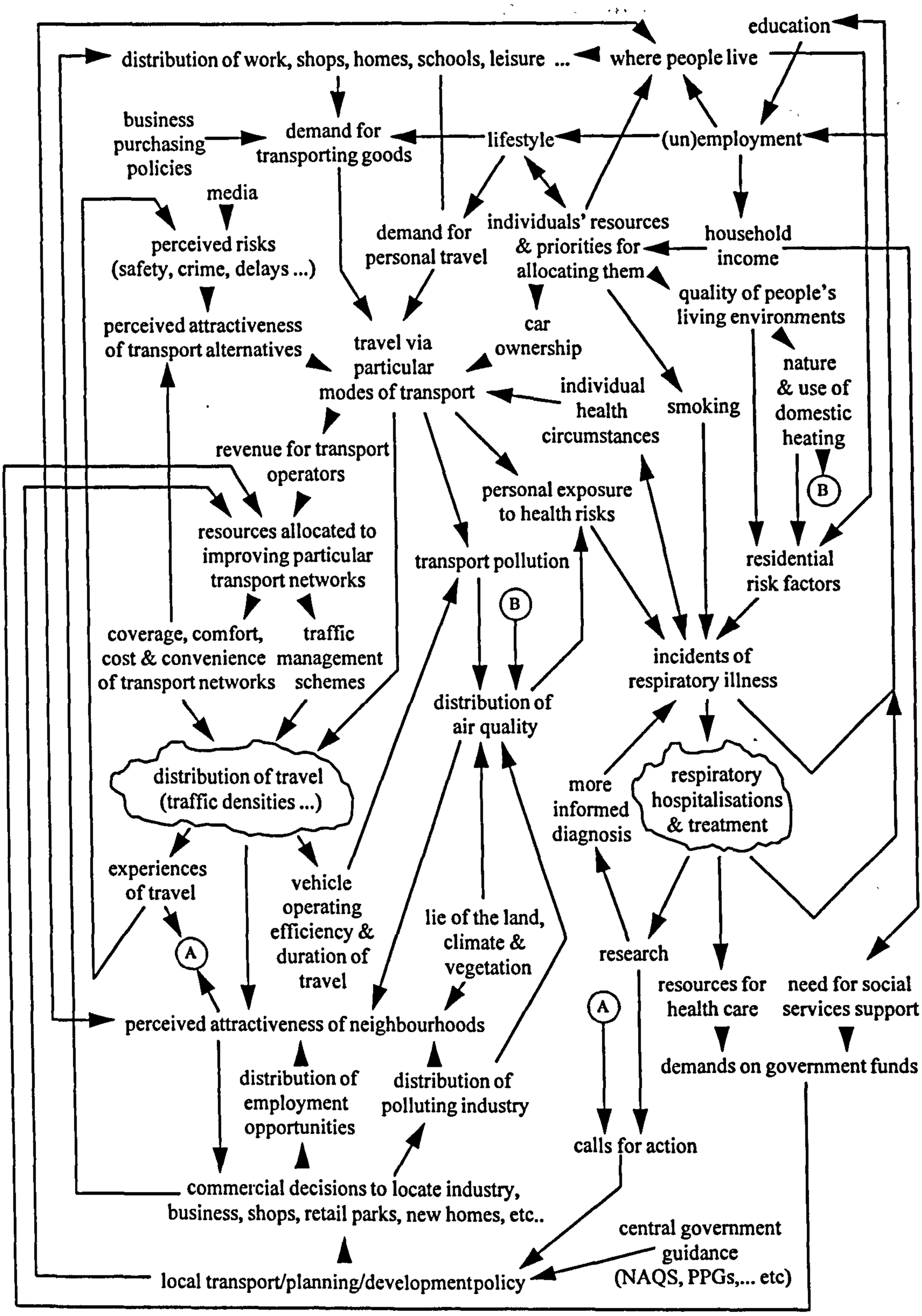

Figure 7-2 Composite pathways model

Figure 7-2 attempts to illustrate participants' perceptions of processes and interactions pertinent to understanding the chosen phenomena of respiratory hospitalisations and

traffic density. Its intricacy and interconnectivity is a reflection of the detailed processural analysis performed during the workshop. (Whilst careful positioning of participants' ideas enabled most interconnections to be shown without major over-lap, the two 'A's and two 'B's proved too difficult to join - they should, however, be read as if they were.) The composite model's emphasis on revealing perceptions of interconnectivity also enables mutual causalities - a particular concern for participants - to be represented:

[Facilitator] ... any vicious circles appear ?

[Several participants] Loads ! ...

(Extract from data integration workshop, 31/10/96)

For instance, if fewer people choose to travel by public transport, then the revenue received by its operators falls. This results in less resources being available for improving the quality of service provided, making public transport less attractive and thus fewer people choose to use it. Whilst this account is presented as a vicious circle, it is clear that a virtuous circle could be a viable alternative. Figure 7-3 illustrates this by reproducing the relevant part of the composite model.

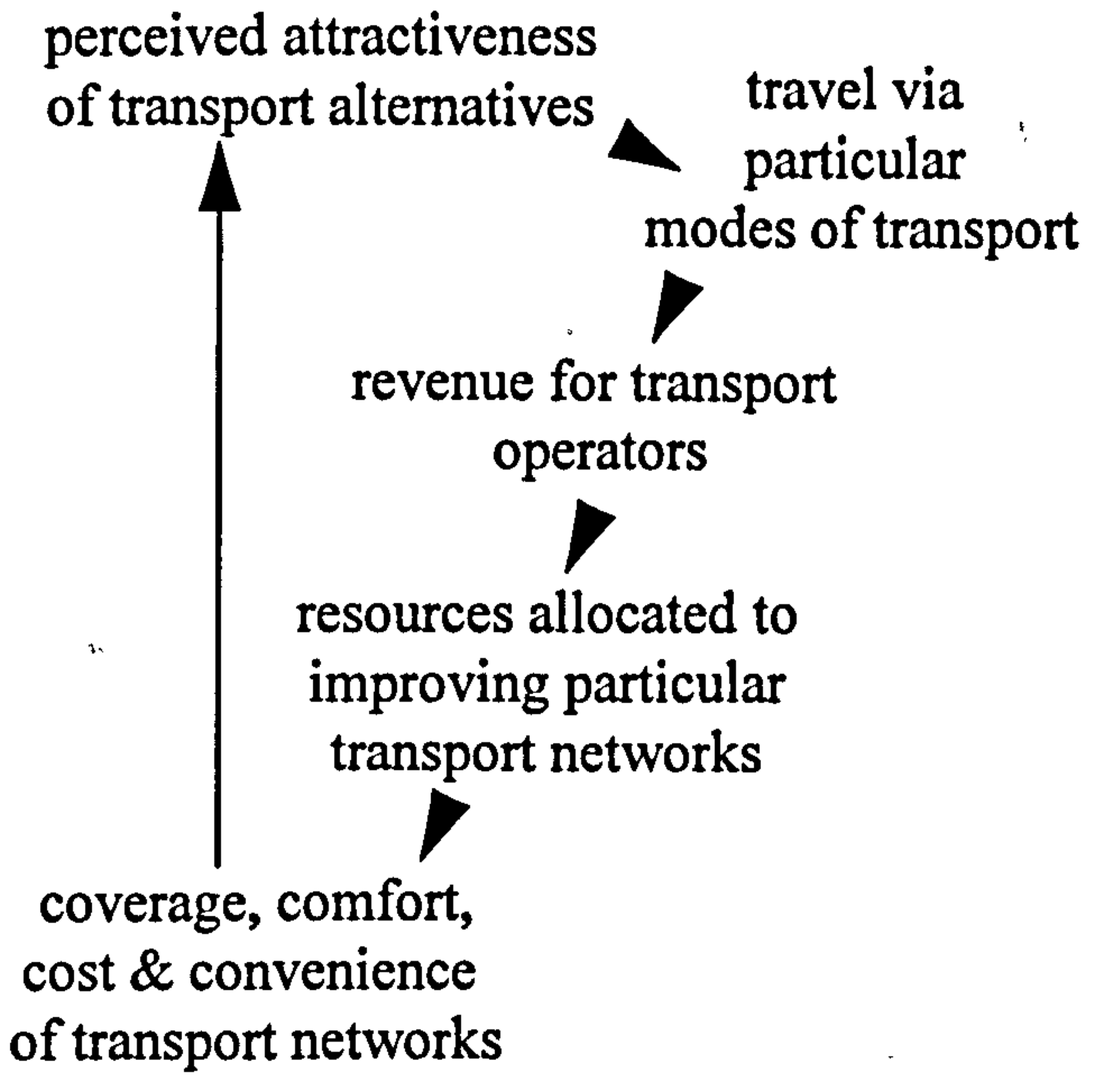

Figure 7-3 A vicious or virtuous circle for public transport use

Further analysis of Figure 7-2 reveals other cycles of reproduction highlighted by participants. For instance, increased personal exposure to poor air quality can lead to respiratory illness; this leads to increased demands on health care resources, which reduces resources available for investing in cleaner transport initiatives. Furthermore, respiratory illness can lead to poor attendance at work or school, leading to reduced employment opportunities and earning potential, placing demands on social services that further reduce resources available for cleaner transport. These direct and indirect effects conspire to reinforce the use of polluting modes of transport that contribute to the original problem of poor air quality.

After using the pathways diagrams to facilitate the process of surfacing and sharing individuals' mental models of pertinent processes, participants were encouraged to consider what action had been taken already and what could be done in the future. The resulting conversation revealed a lack of awareness about potentially-complementary initiatives being undertaken by other agencies:

[Luton LA21 rep.] ... We need an audit of what agencies are doing what at the moment on related issues.
[Mr Kingfisher] Yes, that's been an interesting thing out of today ... I mean you said about this traffic / air quality model, did you know about that ? I mean I certainly didn't ...
[Ms Owl] I was aware they were about, but I didn't know that anybody locally was using them ... I thought it was a more national thing ...

Recognition of previously unexplored opportunities for collaboration seemed to foster a climate for exploring possible next steps together, resonant with Senge (1990)'s "spirit of inquiry":

[S. Beds EHO] ... I wondered if it'd be interesting if you had roads over 5000 movements, or whatever, and looked ... at the relationship between asthma and roads over certain amounts of movements ... It's just a suggestion ...

[Mr Kingfisher] ... There's no reason why we couldn't generate a set of zones ... that are effectively buffers around major roads ...

[Ms Owl] ... we've already separated out the trunk roads ...

[Mr Kingfisher] So, it does look possible ...

(Extract from data integration workshop, 31/10/96)

After exploring opportunities for collaborative work, participants concluded by considering possible mechanisms for keeping each other informed about relevant initiatives. Whilst some potentially-suitable council publications were identified, my suggestion of an Internet site revealed considerable cynicism regarding the potential of local government information technology in this regard:

[County #1] We're post-Web now aren't we ?

[County #2] We used to be able to get on, and now we can't ! ...

My involvement with the data integration workshop concluded by providing Mr Kingfisher with a transcript and summary material for circulation.

7.4 SUMMARY AND CONCLUSIONS

The impetus for the final phase of the fieldwork was to develop the conceptualisation of group learning, that had emerged from earlier work, so that it provided guidance for action on an interpersonal level. My role as designer and facilitator for two group learning events - the NAQS consultation, and the traffic, air quality and health integration workshops - provided grounded insights for developing that conceptualisation.

This grounded insight, and my reflection upon the inspiration for the actions that had produced it, suggested that the concept of group learning would be better reformulated as 'creative dialogue'. These words were not chosen lightly. The word 'dialogue' was chosen to acknowledge the influence of Senge's (1990) work, particularly its emphasis on surfacing and sharing mental models, rather than defending individual positions. The word 'creative' was chosen to reflect attempts to encourage individuals to abandon

traditional boundaries and modes of thinking, so that they might explore how else things could be. It reflects, in particular, the "liberating" role (Morgan, 1996) that metaphor played within the fieldwork.

This concept of 'creative dialogue' will be developed further in the next chapter, where it will also be positioned in the context of emergent ideas from earlier fieldwork, such as stakeholders and networking.

8. INTERPRETING THE FIELDWORK

This chapter will interpret key findings from the fieldwork, drawing on the air quality workshops in particular as a rich source of insights. Looking back over the four phases of the fieldwork, a trajectory is discerned in the guiding vision of the central research outcome. This trajectory reflects increasing familiarity with the problem-context, which underpins the formulation of a constituitive process theory for interpreting actors' dealings with complex, transboundary environmental issues. The chapter summarises concepts that are central to this theory and concludes by introducing a diagrammatic framework suitable for representing them, and their interlinkages.

8.1 REFLECTING UPON THE FINAL PHASE OF THE FIELDWORK

The final phase of the fieldwork set out to develop the conceptualisation of group learning so that it could provide guidance to those who sought to promote it. In accordance with the participative and adaptive philosophy of the research, I attempted to achieve this by adopting the role of designer and facilitator for a series of workshops that sought to enhance understanding of issues of air quality amongst key stakeholder representatives within Bedfordshire. The resulting experience suggested that the "spirit of inquiry" ethos, in which the workshops were grounded, was appropriate to the process of constructing shared understanding of complex issues. It also supported the contention that a "spirit of inquiry" was not a natural outcome of inviting diverse individuals to debate complex issues for which they had assumed responsibility or interest. Indeed, detailed analysis of the workshop transcripts revealed dilemmas faced by a facilitator in seeking to maintain a "spirit of inquiry" in the face of contributions from individuals not willing to follow the suggested norms of non-judgemental, self-questioning behaviour. For instance:

[] It seems to be patently obvious. You don't need a long seminar or a long consultation period to work out that the main problem that most people would agree on is that air quality is about vehicle emissions and that is the one thing we're in trouble with ... '

(Extract from NAQS workshop, 17/10/96)

Dealing with contributions that challenged the "spirit of inquiry", such as the one reproduced above, created dilemmas for which I felt responsible as facilitator. Whilst this kind of behaviour from participants is almost inevitable (Argyris, 1993; Gordon, 1961), it is nonetheless problematic for a facilitator working with a large group and limited time. Attempting to reduce contributions from participants exhibiting fixed mind-sets, so that others might be heard, could be interpreted as a message that defensive routines cannot be changed. I therefore made a deliberate attempt to reframe such contributions in a positive way. For example, in the above incident the participant developed his point by expressing frustration with conflicting goals in town centre parking policy, at which point I intervened with:

> *[Facilitator] That'll provide an excellent example when we go on to brainstorm how to manage when we're being pulled in different directions. Have we pursued this enough or do people want to go further ...*

Whilst this intervention served to postpone the problem, and enabled me to remain consistent in what I said and did, it is not reproduced here as a solution. Instead it demonstrates that facilitating a "spirit of inquiry" appropriate to the exploration of complex issues, is not a trivial undertaking; it requires constant attention and improvisation. This grounded realisation is an important aspect of the reformulation of group learning as 'creative dialogue'.

A second important aspect of the emerging conceptualisation of 'creative dialogue' concerns the role of participants' mental models of pertinent processes and their interactions. Reflecting upon the workshops, it is apparent that a range of techniques can support the process of bringing individuals' mental models into the open so that other workshop participants might learn from them. For instance, Rickards' (1990) technique of formulating complex issues as goal-oriented statements began the process of surfacing mental models, and modification to the deployment of Lemon's (1991) pathways device supported both the surfacing and exploration of mental models. This concern with surfacing and exploring mental models is thus a second major feature of 'creative dialogue'.

A third distinguishing feature of the emerging conceptualisation of 'creative dialogue' concerns the use of metaphor as a liberating device (Morgan, 1993 and 1996). I had elected to use this synectic technique (Gordon, 1961) for two main reasons. First, I believed it would be congruent with the "spirit of inquiry" that I aimed to foster. Indeed, I hoped that, when taken together with the multiple problem formulations that different air quality stakeholders were invited to articulate, the partial ways of seeing provided by novel metaphors would encourage greater support for the contention that each participants' perspective was but a partial way of seeing, and hence the process of sharing them would appear more worthwhile. Second, I was conscious of increasing calls for radical interventions to make dramatic improvements on complex environmental issues, like air quality, and hoped that the liberating potential of metaphor could contribute in this regard. Within the limited time available for the workshops, a realistic expectation would have been to raise awareness of the liberating potential of metaphor in the context of environmental issues in the hope that it might be used outside the session. The NAQS workshop appeared to fulfil this expectation as participants seemed to see its value:

[] If we changed biological weapons to biological infection, then we can talk about infecting populations with a good idea ...

[] I can see some mileage there

[] You're getting close to the true model because, in fact, the danger with some of this stuff is the idea that you can fire a missile onto a target that's conveniently sitting there waiting to be hit and that's it really ... because our problem is people really isn't it, and their behaviour ? ...

[] Aha ... their resistance builds up !

(Extract from NAQS workshop, 17/10/96)

One group even began experimenting with the technique when the second workshop closed. This use of metaphor and imagination (similar to Morgan's, 1993, notion of "imaginisation"), therefore constitutes a vital, reinforcing element of the concept of 'creative dialogue', developed through the workshops.

Following the 'sense of audience' principle, these initial reflections upon the constituent features of the emerging conceptualisation of 'creative dialogue' were further refined through the process of sharing findings from the workshops with pertinent audiences.

8.1.1 COMMUNICATING FINDINGS

In addition to immediate communication with participants through the workshops, and through copies of materials produced therein, I also decided to re-engage the audience that had called for the concept of group learning to be articulated with greater clarity. I thus decided to submit a paper to the 1997 Business Strategy and the Environment Conference with a view to eliciting feedback upon the reformulated conceptualisation of group learning that the workshops had inspired. I entitled the paper: "*Injecting Creativity into Environmental Management: Lessons from a Dialogue on the UK National Air Quality Strategy*", and in contemplating how I would engage the environmental management research and practitioner audience that I anticipated the conference would attract, I found resonance with Schatzman and Strauss' (1973) comments about seeing one's data in a new light. I saw that my work offered a response to a challenge articulated by the conference organiser in a much-quoted paper:

> "Rethinking business strategy along the lines of sustainable development does require a change in corporate culture ... Many of the issues will necessarily challenge the very foundations of the system which we too often see as immovable and will therefore be opposed by vested interests." (Welford, 1993, p. 32)

The approach which I was advocating facilitated a climate for surfacing and exploring the mental models maintained by stakeholder representatives for a particular environmental issue. However, rather than simply reproducing mental models in which the status-quo was inscribed, my approach sought to give due consideration to how else things might be. This audience-inspired realisation strengthened the reformulation of group learning as 'creative dialogue' and confirmed its role as a key component of the process of dealing with complex environmental issues. Furthermore, the level of interest and note-taking that the paper generated during its presentation suggested that the concept of 'creative

dialogue' was resonant with the concerns of those present. Whilst most questions sought further detail on the techniques used, one member of the audience questioned how ideas generated by the workshop would be carried out. Although this question does not undermine the conceptualisation of 'creative dialogue', it proved helpful in locating the process that I had been studying in the broader context of environmental management initiatives. This positioning will be returned to in Chapter 9, as it is now appropriate to summarise the concept of 'creative dialogue'.

8.1.2 THE CONCEPT OF 'CREATIVE DIALOGUE'

Deep reflection upon the fieldwork, supported by contemplation of the language and concerns of relevant audiences, resulted in the identification of the following phrases which characterise the essence of the concept of 'creative dialogue':

- facilitating a spirit of inquiry;
- surfacing and exploring mental models; and
- working together with imagination.

The third phrase makes a deliberate attempt to capture the special way in which metaphor was used at both an individual and group level. In particular, individuals were encouraged to work together with their respective imaginations, and the group as a whole was encouraged to work together, using imagination. Its phrasing is thus deliberately ambiguous.

8.2 REFLECTING UPON THE FIELDWORK AS A WHOLE

Before attempting to integrate key concepts that have emerged from the fieldwork, it is first useful to reflect upon the pathway that has led to this point.

8.2.1 FIELDWORK PROCESS

Table 8-1 uses the research framework developed in Chapter 3, to summarise the fieldwork undertaken in support of the thesis that a 'sense of audience' is a valuable guiding principle for those dealing with complex issues. Consistent application of the

framework for each phase of the fieldwork enables the trajectory of my emerging appreciation of the problem-context to appear in stark relief. Indeed, to illustrate the impetus behind the movement, the Table also includes entries that show how the guiding vision of the research endeavour was reframed through reflection carried out at the end of each fieldwork phase. In this way, the Table provides a clear summary of how an initial interest in integrating environmental data to gain holistic understanding, became transformed into an interest in notions of networking and group learning in multi-agency responses to complex, transboundary environmental issues. Although the adaptive approach to researching complex and dynamic issues, characterised by a mutually-informing relationship between research vision and fieldwork, will be more fully evaluated in Chapter 10, Table 8-1 attempts to demonstrate the study's emergent trajectory, and highlights its congruence with the adaptive philosophy of research articulated in Chapter 3.

	Phase 1	Phase 2	Phase 3:	Phase 4:
Vision of research	integrating env data to gain holistic understanding	integrating data & expertise to inform actors' dealings with env issues	transboundary networking to bring stakeholders together on complex issues	networking & group learning as a response to complex transboundary issues
			Getting in & getting on	
Research setting	waste mgmt co. looking to use IT in env mgmt	County Council project to integrate env. data	actors interested in dealing with complex env issues	multi-agency response to air quality issues
Negotiating access	conducting an env. info study	investigating & facilitating data integration project	exploring resonance of ideas emerging from fieldwork	experimenting with techniques to promote group learning
Researcher role	IT expert	PhD student / facilitator	PhD student	mgmt consultant / PhD student
			Gathering data	
Encounter strategy	WasteCo staff using & providing env info	network of actants shaping the data integration project	those best-placed to critique the emerging thesis	stakeholders in Beds air quality invited to workshops
Instruments	guided conversation; & interpreting texts & IT	focus groups; texts; & guided conversation	guided conversation; texts; & conf. feedback	variety of creative dialogue techniques
			Generating theory	
Theoretical sensitivity	env mgmt; org learning; IS; & waste mgmt	+ structuration theory; & integrated env mgmt		+ innovation; mental models; & facilitation
Data analysis	systematic coding (grounded theory)	systematic coding	assessing resonance with 4 objectives	systematic coding; & pathways
Validation strategy	data triangulation; & informant validation	data triangulation; & informant validation	informant validation; & audience feedback	data & researcher triangulation; & audience feedback
			Communicating findings	
Audiences	WasteCo informants; env mgrs with IS problems; & IS students	Beds project team	env mgmt. researchers & practitioners	collaborating agencies; env mgmt researchers & practitioners; & PhD assessors
Communication	consultancy-style report for WasteCo; panel member at ITEMs conf; & student assignment	detailed fieldnotes; & diagrammatic summary	presenting a paper at Business Strategy & the Env conf.	summaries of workshop output for participants; paper to Business Strategy & the Env. conf; & PhD thesis
			Reflection	
Refinements to the vision	integration is more than a technical-puzzle; & organisation is not a helpful unit of analysis		concept of group learning needs further development	ideas offer a process theory of the formation of networks to respond to complex issues
Emerging concepts	sense of audience	stakeholders; issues, networking & group learning		creative dialogue

Table 8-1 Fieldwork overview

8.2.2 EMERGENT CONCEPTUAL FRAMEWORK

Having summarised the fieldwork process it is now possible to develop a synthesised conceptual framework that unites, and reveals relationships between, concepts developed through the different phases of the fieldwork. In determining an appropriate structure for such a framework, the original intention of formulating a constituitive process theory of actors' dealings with complex environmental issues needs to be born in mind. Following the 'sense of audience' principle, this theory would need to provide a concise representation of salient points and capture the mutually-producing relationships therein. However, whilst Walsham (1993) and others argue for theories that interweave context, process and content, they offer little guidance on a graphical way in which this might be achieved. Section 5.4.1.1 began to deal with these problems with its critique of Giddens' (1984) structuration theory. In this, it highlighted the role of routine in enabling the context (in which one finds oneself), to be taken for granted, and Giddens' three dimensions of the duality of structure proved helpful in identifying pertinent attributes of precarious (but nonetheless useful) classifications of stakeholders. Whilst, its portrayal of a mutually-reproducing relationship between action and structure is at the heart of any constitutive process theory, the diagrammatic contribution from Giddens' work is limited. Fortunately, Callon and Law (1989) suggest principles that could underpin such a representation:

> "... though a distinction between context and content is indeed relevant ..., this is not something whose location and character can be legislated by the analyst. We argue that it is a division that is negotiated and renegotiated by the actors themselves."
> (p. 57)

There are two aspects of this quotation which are relevant to this research. First, the grounded approach to the fieldwork has ensured that emergent conceptualisations of process relate to the processes of ordering - the negotiations and renegotiations - of the actors themselves. Second, the centrality of a 'sense of audience' to the approach can be seen as a deliberate attempt to ensure that context and content distinctions (and indeed the structures highlighted within them) are not legislated by the analyst alone. This point is

perhaps best-illustrated by the commitment to "exploring the adequacy of ... simplifications with the actors themselves" that underpinned the central study (see page 141). An appropriate framework could thus represent content, in context, emerging through a process that arises from and reconstitutes context (Figure 8-1, below).

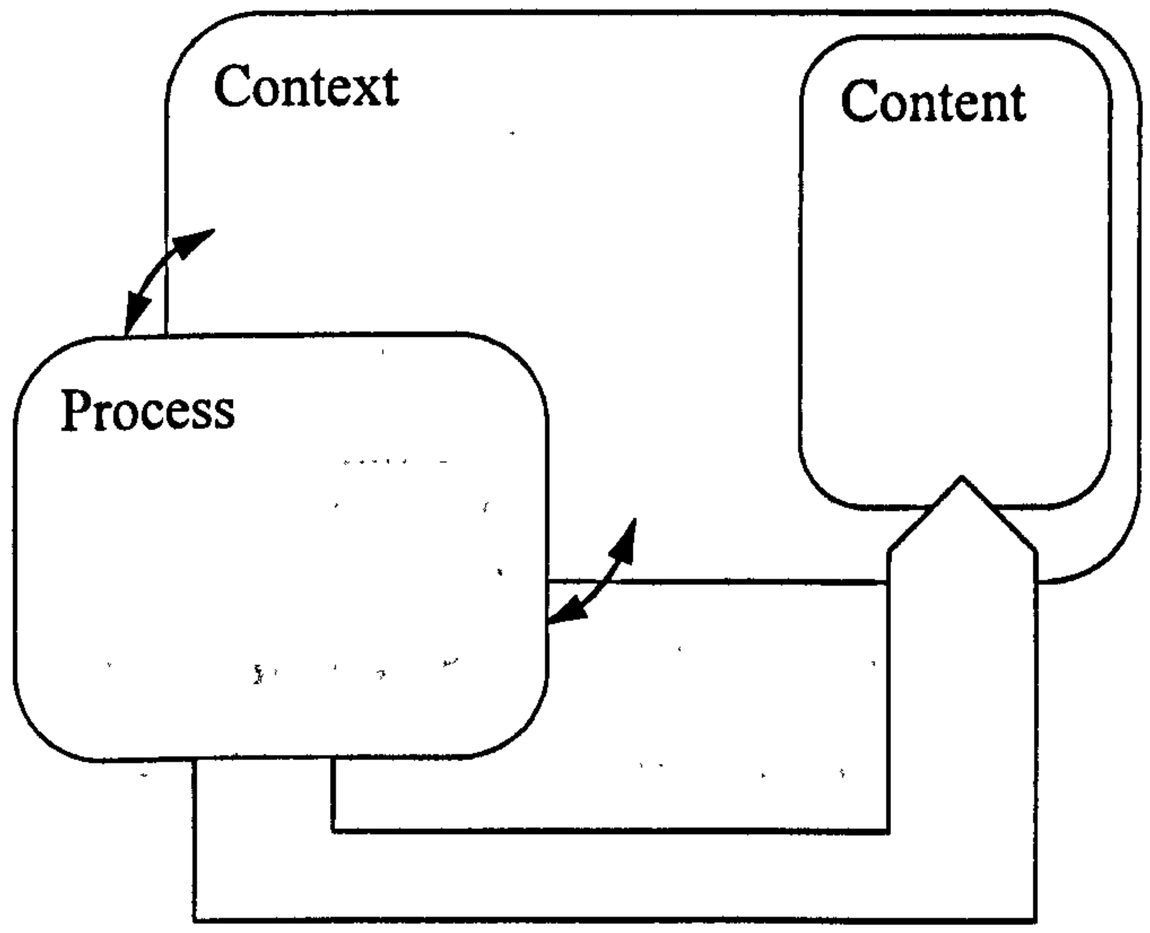

Figure 8-1 A framework for representing constituitive process theories

Like any model, the above representation will inevitably be a simplification of a more complex reality, however it is offered as a broad framework for positioning concepts that have emerged as meaningful "punctualisations" (Law, 1992) within the fieldwork. This positioning of these concepts is now presented below (in Figure 8-2):

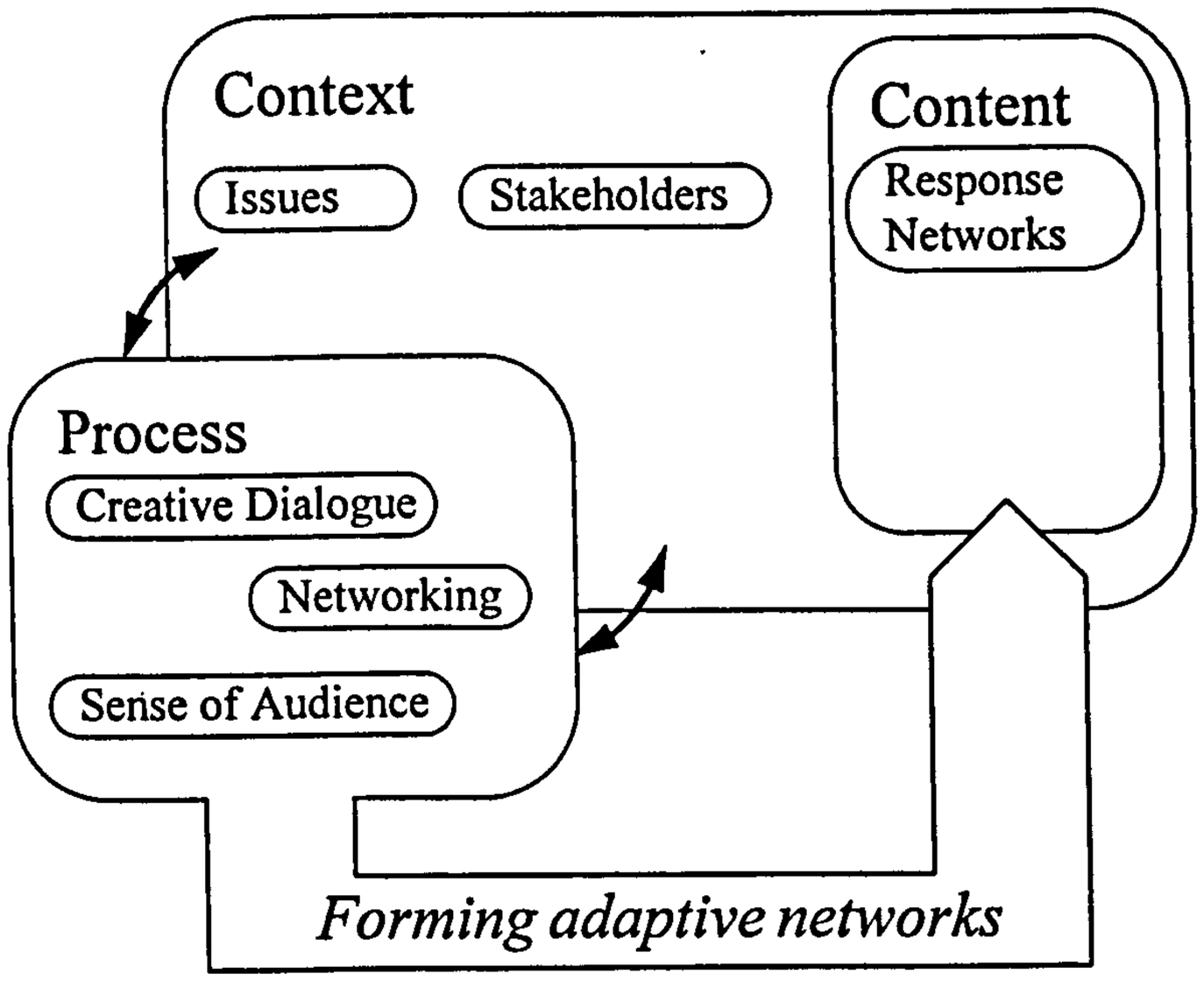

Figure 8-2 Key concepts in the constituitive process theory of dealing with complex, transboundary environmental issues

A textual representation of the theory in Figure 8-2 might be:

Where ?	Context	Against the backdrop of a mutually-defining relationship between issues and stakeholders ...
What ?	Content	adaptive response networks can form ...
How ?	Process	through a process of networking and creative dialogue, guided by a sense of audience.

However, as Senge (1990) notes, textual accounts are not well-suited to capturing mutual causality; they tend to lend themselves more naturally towards linear representations:

> "Western languages, with their subject-verb-object structure, are biased towards a linear view. If we want to see systemwide interrelationships, we need a language of interrelationships, a language made up of circles." (p. 74)

To maintain empirical fidelity, the linear textual account of the theory (which appears above) would need to indicate that the context from which the process arose, was being reordered by that process. As this makes the textual representation of the theory

unwieldy, the diagrammatic representation is used henceforth for expanding upon the theory's core concepts and their interrelationships.

The grounded fieldwork approach has enabled core concepts to be articulated with clarity, and in terms resonant with informants' realities. With the exception of the conceptualisation of 'response networks', which will be developed through a literature survey that seeks to locate and evaluate the substantive contribution of this work (see Chapter 9), the key attributes of those concepts, and their inter-relations are represented in Figure 8-3, overleaf. These attributes are offered as 'important to keep sight of' when the complexity they characterise becomes effaced (or, in Law's, 1992, terminology, is "punctualised") in the "black-boxes" of 'issues', 'stakeholders', 'response networks', 'creative dialogue', 'networking', and a 'sense of audience'.

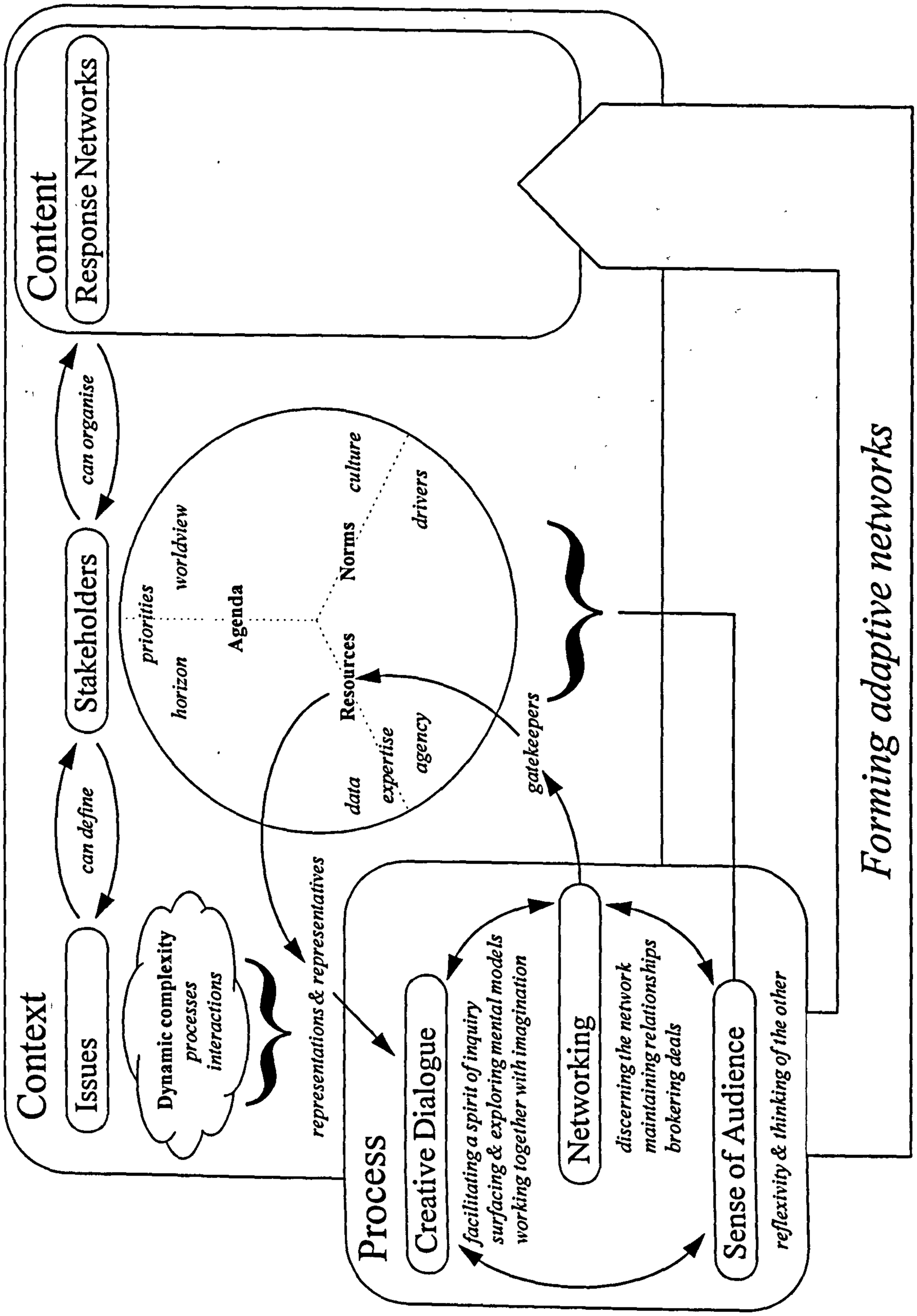

Figure 8-3 Partial detailed constituitive process theory for interpreting actors' dealings with complex, transboundary environmental issues

Figure 8-3 represents a synthesis of the conceptualisations developed so far in the thesis, ie 'issues' (section 5.4.2.2.2); 'stakeholders' (section 5.4.2.2.1); 'networking' (sections 5.4.2.2.4 and 7.1.1); 'creative dialogue' (section 8.1.2) and a 'sense of audience' (Chapter 1). In addition to showing characterising attributes for each concept, the diagram also illustrates how the concepts are inter-related. Like the concepts themselves, their inter-relationships are also grounded in the fieldwork. For instance, Figure 8-3 reflects how 'networking' involved negotiating with gatekeepers to secure access to resources that could be brought together in 'creative dialogue'. Those resources included, in particular, stakeholder representatives and the representations of issues which they hold, such as data sets (section 7.3.2).

8.3 SUMMARY

Through reflection upon the air quality workshops, this chapter has expanded upon the initial conceptualisation of 'creative dialogue' presented in the previous chapter. This conceptualisation addresses the research agenda that inspired the final phase of the fieldwork in that it offers an account of group learning that provides direction to those who seek to promote it. Looking back over the fieldwork as a whole, a clear trajectory in the guiding vision for the research has been discerned. This trajectory is consistent with the adaptive philosophy of research articulated in Chapter 3, and charts the evolution of a grounded constituitive process theory for interpreting actors' dealings with complex (transboundary) environmental issues. After giving consideration to the limitations of a textual account of this theory, a diagrammatic representation has been adopted as most suitable for locating and clarifying pertinent concepts, and their inter-relationships. This diagrammatic representation has highlighted the need for a fully-developed conceptualisation of adaptive response networks - the outcome of a process of reordering stakeholders and issues. This need will be addressed in the following chapter, where a complete diagrammatic representation of the process theory will be produced and positioned with regard to relevant environmental management literature.

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9. EVALUATING THE SUBSTANTIVE CONTRIBUTION

This chapter reflects upon implications from the thesis for the substantive theme of environmental management.

So far the thesis has established, both from the literature survey presented in Chapter 2, and from the fieldwork presented in Chapters 4 through 7, that environmental issues present complex, transboundary problems for organisational actors. Furthermore, a theory has been developed for interpreting the process through which actors can organise responses that reflect the transboundary nature of such issues. In order to develop this theory more fully, it will now be located in the context of recent literature on integrated and adaptive management approaches to environmental issues.

9.1 LITERATURE SURVEY

Although Born and Sonzogni (1995) acknowledge lack of consensus, and even "substantial confusion", regarding the notion of integrated environmental management, they offer a list of key attributes which "captures much of the idea:

- coordinated control, direction or influence of all human activities in a defined environmental system to achieve and balance the broadest possible range of short- and long-term objectives ...;
- a process of formulating and implementing a course of action involving natural and human resources in an ecosystem, taking into account the social, political, economic, and institutional factors operating within the ecosystem in order to achieve specific societal objectives ...;
- an inclusive approach that takes into account the scope and scale of environmental and human issues and their interconnections. A strategic and interactive process is used to identify key elements and goals at which to direct attention, which in turn become the focus of an interorganisational and coordinated approach to undertaking environmental management ..." (p. 168)

Whilst their emphasis on natural resource management is apparent, resonance between the theory being advanced in this thesis and their points, particularly the third, is clear. Moreover, Born and Sonzogni regard such integrated approaches as a "new paradigm" inspired by "ineffectual or unsatisfactory, often undesired, management outcomes ... [that] may result ... from incremental and vertically, horizontally and functionally fragmented efforts to address complex problems" (1995, p. 168). This call for holistic approaches to complex issues echoes throughout the study, and throughout recent environmental management literature (see, for instance, Hadfield and Cannibal 1996; Haney and Power, 1996; Hopfenbeck, 1993; or Imperial et al., 1993). Indeed, a new leitmotiv of 'learning to manage and managing to learn' can be discerned. This is embodied in the concept of adaptive management, and common roots can be traced in its recent use. For instance, Allen and Bosch (1996) acknowledge the influence of Walters' work (particularly Walters and Hillborn, 1978; and Walters and Holling, 1990), and both McLain and Lee (1996), and Haney and Power (1996), draw upon Walters' (1986) definition:

> "[Adaptive management] begins with the central tenet that management involves a continual learning process that cannot conveniently be separated into functions like 'research' and 'ongoing regulatory activities', and probably never converges to a state of blissful equilibrium involving full knowledge and optimum productivity." (p.8)

However, McLain and Lee (1996) argue that, so far, practical implementations of the concept have tended to over-emphasise "rational comprehensive planning models". Their review of attempts to implement the concept in natural resource management initiatives suggests ...

> "... that scientific adaptive management relies excessively on the use of linear systems models, discounts nonscientific forms of knowledge, and pays inadequate attention to policy processes that promote the development of shared understanding between diverse stakeholders. To be effective, new adaptive management efforts will need to incorporate knowledge from multiple sources, make use of multiple systems models, and support new forms of cooperation among stakeholders."
> (McLain and Lee 1996, p. 437)

Resonance between theory developed through the fieldwork and McLain and Lee's "new adaptive management" is obvious. However, they, like their fellow proponents of adaptive management (such as Imperial et al., 1993; and Haney and Power, 1996), concentrate on sketching a broad picture of the characteristics of adaptive management, using brief examples to illustrate those characteristics. In contrast, this study's grounded constituitive process theory provides a rich account of how adaptive responses can be fostered, offering sensitising concepts on both a strategic and an interpersonal level. The study therefore complements published work on adaptive management, and, in the grounded theory tradition, this literature will now be used to sharpen the conceptualisation of "adaptive response networks" that has been, until this point, only loosely-defined within the theory.

9.1.1 THE CONCEPTUALISATION OF "ADAPTIVE RESPONSE NETWORKS"

9.1.1.1 SHARED VISION

As the preceding literature review has made clear, a commitment to the principle of 'learning to manage and managing to learn' is central to the notion of an adaptive response network. Exploring the extent to which such a commitment was shared by pertinent actors had a profound influence on the research encounter strategies adopted in the fieldwork. Whilst it may have been phrased differently in earlier fieldwork accounts - informants in the exploratory study, for example, talked of "... *learning to see [one's] work in terms of the bigger picture*" - the mutually-informing relationship between making interventions and learning about the complex nature of environmental issues, has been a core feature of actors' espoused intentions in the settings that were studied. Indeed, the air quality workshops, in the final phase of the fieldwork, can be interpreted as attempts at 'managing to learn' which were grounded in participants' experiences of, and sought to influence their plans for, 'learning to manage'.

9.1.1.2 A DURABLE CORE

Comparison between the fieldwork and the literature of adaptive environmental management revealed a second distinguishing feature of adaptive response networks: the notion of a durable core. Whilst glimpses of this feature are available within the literature, the unique opportunity afforded by the EASI LIFE project bid, and the innovative approach of exploring potentially relevant literature with the project champion (Mr Kingfisher), enabled a clearer picture of the durable core of an adaptive response network to emerge. That picture involves two key components: brokers and information infrastructure.

As the central study made clear, Mr Swift's reflections upon his jointly-funded position in Bedfordshire County Council had a major influence on the conceptualisation of a network broker. The resultant image of an individual seeking out potentially-relevant resources and negotiating with the appropriate gatekeepers (of those resources) to enrol their support in environmental initiatives that transcend organisational boundaries, is similar to Kanter's (1994) notion of a "boundary diplomat" or "relationship manager". Indeed, it is particularly resonant with the new role of an environmental manager envisioned by Selin and Chavez (1995):

> "Managers need new skills to move from the expert opinion role in traditional environmental management to an empowerment role as a mediator, catalyst, or broker in the new order. ... Complex resource problems have prompted managers to adopt a domain perspective ..., where the agency is viewed as just one of a set of actors joined by a common problem or interest." (pp. 189-190)

The "domain perspective" that Selin and Chavez identify above, is well-represented in the contextual model of issues and stakeholders that this study provides. Furthermore, the notion of joint-funding for broker positions can be seen as offering a practical mechanism for legitimating lateral, transboundary contact, and, in so doing, it addresses some of the difficulties that Selin and Chavez identify. Indeed, joint-funding from the Environment Agency and the County Council was contemplated as a symbolic gesture of commitment

and support that would provide a durable core for the EASI-LIFE project. However, as Mr Swift's experience of being funded by two County Council departments revealed, jointly-funded positions can create a new problem space that involves dealing with multiple, and possibly conflicting, allegiances - a point resonant with matrix management concerns (Daft, 1994, pp. 308-310), that will be developed later (in section 9.1.1.4).

The second component of a durable core can be classified as information infrastructure. This refers particularly to the technological resources involved in the collection, management, analysis, communication and presentation of what actors in the response network consider to be pertinent data. As Law (1992) and Walsham (1997) note, the ordering and arrangement of technological resources can provide durability to an otherwise precarious arrangement of social interactions. This durability seems to arise from determination to realise benefits from resources invested in such information systems, and from the routine that the systems engender through interactions that they simultaneously enable and constrain (Orlikowski and Robey, 1991).

Although the role that technology plays in providing a durable core to adaptive response networks appears under-developed in the literature of environmental management, fieldwork suggested that a flexible information infrastructure, accessible by the 'right people', was a significant concern for those seeking to pursue integrated approaches to environmental issues:

> *"We do have a corporate information system service ... which [so far] has not been able to deliver ... [This has compromised] an infrastructure for the EA ... [We know we need] easy pulling together of information in standard formats, managed across the whole country. We've now got a network infrastructure. We've now got e-mail. So, a lot of the fundamental communication building blocks are now in place. Getting the right tools, in terms of databases [is next] ..."*
> (Mr Osprey, Senior Manager, Environment Agency)

> *"One of the main deliverables of the project will be the information system which will provide for the integration of environmental data relating to the state of air, water and*

land (and factors affecting the state of air, water and land) with the more readily-available data of major service providers across the spectrum of Local Agenda 21 issues (health, education, social services, safety, etc). The system will be easy to use and widely accessible. It will become a basic ongoing source of knowledge to a wide range of policy makers, service deliverers and other users in public authorities, private businesses, academic institutions and beyond. ... Innovative use will be made of the Internet for access to the Project's information system and for the proposed electronic mail discussion group as an ongoing platform for local and Community-wide discussion of the value of the project ... "

(EASI-LIFE Project Bid)

However, the notion of diverse stakeholders contributing, and having access, to a shared information system (or common data pool) raised concerns about the locus of ownership and control. Such concerns recurred throughout the exploratory and central studies, and seemed resonant beyond those settings:

"... that's the trouble with data management - it's perceived as idealism, unnecessary corporatism ... if you've got functions who are experts, they have their own models, they have their own ways of interpreting ... I am convinced that we don't want a huge integrated catchment model. It's very expensive, high risk ... the GIS data person takes over the ownership of it. The data person becomes the powerful person, rather than the person interpreting it, and the focus is on the presentation rather than on the interpretation. ... [I]f you dump it all into one common approach you are actually creating inertia ... And I think, in these technical areas, a lot of them don't want to be tied into something that you thought was a good idea today. ... And actually ... that fits the way this organisation works because it keeps the control with the local person ..."

(Mr Osprey, Senior Manager, Environment Agency)

"The New Brunswick case also illustrates the danger of relying on one stakeholder to handle monitoring and evaluation: the temptation to hide information unfavourable to the data keeper's interests is very strong."

(McLain and Lee, 1996, pp. 444)

Even proponents of computerised environmental decision-support systems who adopt a rational technical perspective on the notion of information infrastructure, acknowledge the importance of representing a "hologram" (Senge, 1990) of pertinent perspectives within the system:

> "Obviously, the adequate performance of SIPA [an information system for environmental planning] requires a new scientific concept along the lines of the general systems, ecology and information theories without discarding contributions from the more traditional sciences if their supply of knowledge is structured in a new, more integrating and operative form. ... This approach requires a technical team with an integrating vision of the environment, including socio-economic, technological and administrative aspects in addition to cybernetic, naturalistic and ecological approaches."
>
> (de Pablo et al., 1994, p. 240)

It is thus clear that whilst an information infrastructure can provide durability to an adaptive response network, it can be open to criticism for supporting systematically-distorted communication and interactions, and can raise concerns over the locus of ownership and control of data that stakeholders regard as sensitive. Whilst the management of such concerns appears central to the process of sustaining adaptive response networks, the fieldwork has provided insufficient material for exploring this in greater depth. This realisation helps to clarify limitations on the contribution to knowledge from the thesis (see section 9.5), and it raises an agenda item for further study that will be explored in more depth in Chapter 11.

9.1.1.3 OPEN, COLLABORATIVE PROJECTS

A third distinguishing feature of adaptive response networks concerns vehicles for coordinating action, and the normative principles for guiding such action. Within the fieldwork, the term "project" was regularly used to describe the former; however, the latter deserves more expansion. It refers, in particular, to the fieldwork's emphasis on

designing interventions based on a composite understanding of pertinent processes, rather than limiting the space of possible interventions to disciplinary boundaries or horizons inscribed in organisational routine. A related point is demonstrated in the following quote. Here, Wieringa and Morton (1996) challenge dominant notions of accountability (a point that will be returned to in Chapter 11) with their suggestion that time frames used for managing natural resources such as water should be 'in-tune' with processes that sustain those resources, rather than simply reflecting arbitrary social constructions, like accounting periods:

> "Adaptive management is flexible enough to incorporate another potentially useful management concept that is receiving increasing attention in resource management and scientific circles. This concept is built around the idea that efforts to provide the best possible conditions for the resources of primary concern need not, and should not, be made each and every year, especially if detrimental to other resources or economically costly. Instead the natural variability of the system, primarily the annual water volume and the timing of runoff, should be considered and management for different groups of resources undertaken depending on the water year. ... In the past, management decisions have tended to be inflexible, locking agencies into one narrow track that could benefit one resource to the continual detriment of others."
> (Wieringa and Morton, 1996, p. 835)

This call for open, collaborative interventions, informed by ongoing efforts to share diverse perceptions of pertinent processes, can be contrasted with closed, single-stakeholder interventions. In the latter, spatio-temporal and disciplinary horizons, inherent in the agenda, norms and resource-allocation structures that constitute the stakeholder group, are reproduced through interventions as a matter of routine, without necessarily questioning their appropriateness. As Lemon (1991) has shown through his pathways analysis of land-use planning, such single-perspective approaches to complex issues regularly lead to unanticipated and unintended consequences, as pertinent processes often fall outside the horizon of interest for a single stakeholder. In drawing this comparison, the conceptualisation of a stakeholder developed in section 5.4.2.2.1, is being used to categorise significant variety within the community of interest. Therefore, whilst

a 'single-stakeholder' approach will inevitably be a simplification, it is nonetheless useful as a contrast to the 'open, collaborative interventions' that characterise adaptive response networks. Indeed, Pedler et al. (1991) draw a parallel distinction based upon the two everyday meanings of the word 'organisation' - organisation as a process, and organisation as a bounded entity:

> "Who we see ourselves working in company with creates and limits our opportunities. ... Thinking of company in the organisation as process sense can extend our boundaries and help us think outside our habitual frames of reference." (p. 138).

Whilst resonance with the 'sense of audience' guiding principle is obvious, the fieldwork has also identified a practical focus for designing open, collaborative interventions. This focus is provided by Senge's (1990) notion of "leverage" (section 7.2.3.2). Feedback from the air quality workshops suggested that, as a focus for collaborative endeavour, the notion had more than just intuitive appeal. Indeed, when taken together with techniques for exploring individuals' anticipations of the consequences of potential interventions, the notion appears to offer a sound basis for designing interventions. Moreover, the fieldwork demonstrated the potential of techniques, such as pathways analysis (Lemon, 1991) and soft-systems methodology (Checkland, 1981), for exposing possible interventions to scrutiny from a range of pertinent perspectives. The use of these "holistic techniques" within the field is resonant with that described by Brown and MacLeod (1996):

> "... the essence of the soft systems argument, ... [takes] a position that decision makers should at least consider the total system before reducing it into its elements ... The key to these holistic techniques largely lies in the activities for constructing rich pictures of current problem situations, determining desirable future conditions, mapping pathways for potential action and developing human activity systems to effect the actions ..."
> (p. 292)

The importance of the multiple-perspective scrutiny that such techniques provide, is reflected in the final characteristic of 'open, collaborative projects'. Indeed, from the

central study onwards, "working with diversity" has been a distinctive feature of the fieldwork, but, as Pedler et al. (1991) suggest, diversity can be problematic for organisational actors, particularly those with management responsibilities:

> "For many years companies have tried to suppress diversity, preferring sameness and uniformity because this is easier to manage. Acknowledging diversity or differences can lead to loss of control, which is something we always fear when we are in charge of something." (p. 114)

Whilst it may be problematic, this study is not alone in recognising the importance of perceptual diversity for responding to complex environmental issues. Crance and Draper's (1996) conclusions, for instance, place it firmly on the agenda for future work:

> "These strategies should ... improve environmental equity and diversity. For example, by fostering multiparty communication, greater consensus may be reached concerning the range of values placed on resource amenities. From a manager's perspective, improved cooperation among interested parties should increase understanding of and support for management initiatives." (p. 183)

This study can thus be seen as a grounded attempt to operationalise the strategies that Crance and Draper envision above. Indeed, strong resonance can be seen with Allen and Bosch's (1996) conceptualisation of integrated systems to support adaptive land care management:

> "Facilitated workshop formats provide a learning environment, within which participants develop a shared understanding of how others see the world and how that shapes the way they act in it. Importantly, the process recognises the contextual nature of information. ... Diversity is encouraged, rather than undervalued. This makes it less likely that useful information will be dismissed out of hand, and acts to minimise unnecessary conflict over the value and relevance of information supplied by different sources." (p. 2)

The notion of working with diversity reinforces the earlier ideas of focusing on leverage, exploring intuition and seeking to make interventions that are 'in-tune' with key processes. Together, these ideas help define open, collaborative projects that characterise adaptive response networks.

9.1.1.4 LOOSE ASSOCIATIONS

In his classic paper, Granovetter (1973) describes a paradox that suggests an important role for "weak ties" in processes of social cohesion:

> "... weak ties, often denounced as generative of alienation ... are here seen as indispensable to individuals' opportunities and to their integration into communities; strong ties, breeding local cohesion, lead to overall fragmentation." (p. 1378)

Although he shies away from a prescriptive definition, he offers an image of weak ties between acquaintances, rather than between friends, and he contrasts them with ties within cliques. Indeed, his observations about the strength of a tie being associated with the regularity with which it is enacted, are not dissimilar to Giddens' (1984) on the contribution routine makes to the "seeming fixity" of social structures. In considering adaptive response networks, some of Granovetter's observations about weak ties offer salient points of connection:

> "... whatever is to be diffused can reach a larger number of people, and traverse greater social distance ..., when passed through weak ties rather than strong." (p. 1366)

This suggests that sporadic personal contact between brokers and individuals from pertinent stakeholder groups, on the margins of close-knit, project-oriented responses to particular environmental issues, might play an important role in sustaining the adaptive capacity of a response network. In particular such contact could maintain awareness and hence foster flexibility and a latent capacity for future action, on the part of both the broker and the individual concerned. In this way, the notion of weak ties provides a link between the process of networking and the content of adaptive response networks.

Furthermore, Granovetter's observation provides new ways of seeing the creative dialogue workshops that constituted the final phase of the fieldwork. First, the data integration workshop can be distinguished from the NAQS workshop on the grounds of stronger ties between participants - the majority had been interacting with each other, and with Mr Kingfisher, prior to the event, in order to prepare their data sets for presentation. Second, the NAQS workshop, in particular, can be viewed as fostering latent capacity for future collaborative action. Indeed, this second point is something of a corollary of the first; however, together they help strengthen the connection between the process of creative dialogue and the content of adaptive response networks.

An additional point of connection with Granovetter's work concerns individuals' abilities to sustain strong ties with both their original stakeholder groups (or cliques) and issue-based social groupings in the form of particular transboundary projects. Granovetter draws attention to the "psychological strain" that such individuals could face in attempting to sustain strong ties with both, particularly if the agenda, norms or resource allocation structures of the stakeholder group (with which the individual identifies), are incongruent with those of the project. Whilst such 'strain' may be regarded as "creative tension" (Senge, 1990), and can be equated with Pedler et al.'s (1991) call for individuals to embrace images of an organisation as both a bounded entity and a process, the potential for the existence of "psychological strain" helps shape an agenda for further work. This agenda will be explored more fully in Chapter 11, however it is useful at this point to note resonance between "psychological strain" and Giddens' (1991) emphasis on the "highly-modern" project of constructing the self within an interwoven world of diverse, continually-shifting social networks.

9.1.1.5 SUMMARY OF THE CONCEPT OF ADAPTIVE RESPONSE NETWORKS

In sum, the grounded conceptualisation of adaptive response networks can be characterised by the following table:

Shared vision	*learning to manage & managing to learn*
Durable core	*brokers & information infrastructure*
Open, collaborative projects	*focusing on leverage & intuition*
	making interventions 'in-tune' with processes
	working with diversity
Loose associations	*flexibility & latent capacity from weak ties*

Table 9-1 Grounded conceptualisation of adaptive response networks

This conceptualisation distinguishes adaptive response networks from approaches that direct their effort towards reorienting stakeholder boundaries to be more congruent with issues that are currently considered pressing. Rather than embarking on a path of continual restructuring, adaptive response networks involve the formation of parallel structures for sharing understanding. They can thus be glimpsed in the formation of organisations across organisations in response to particular environmental issues:

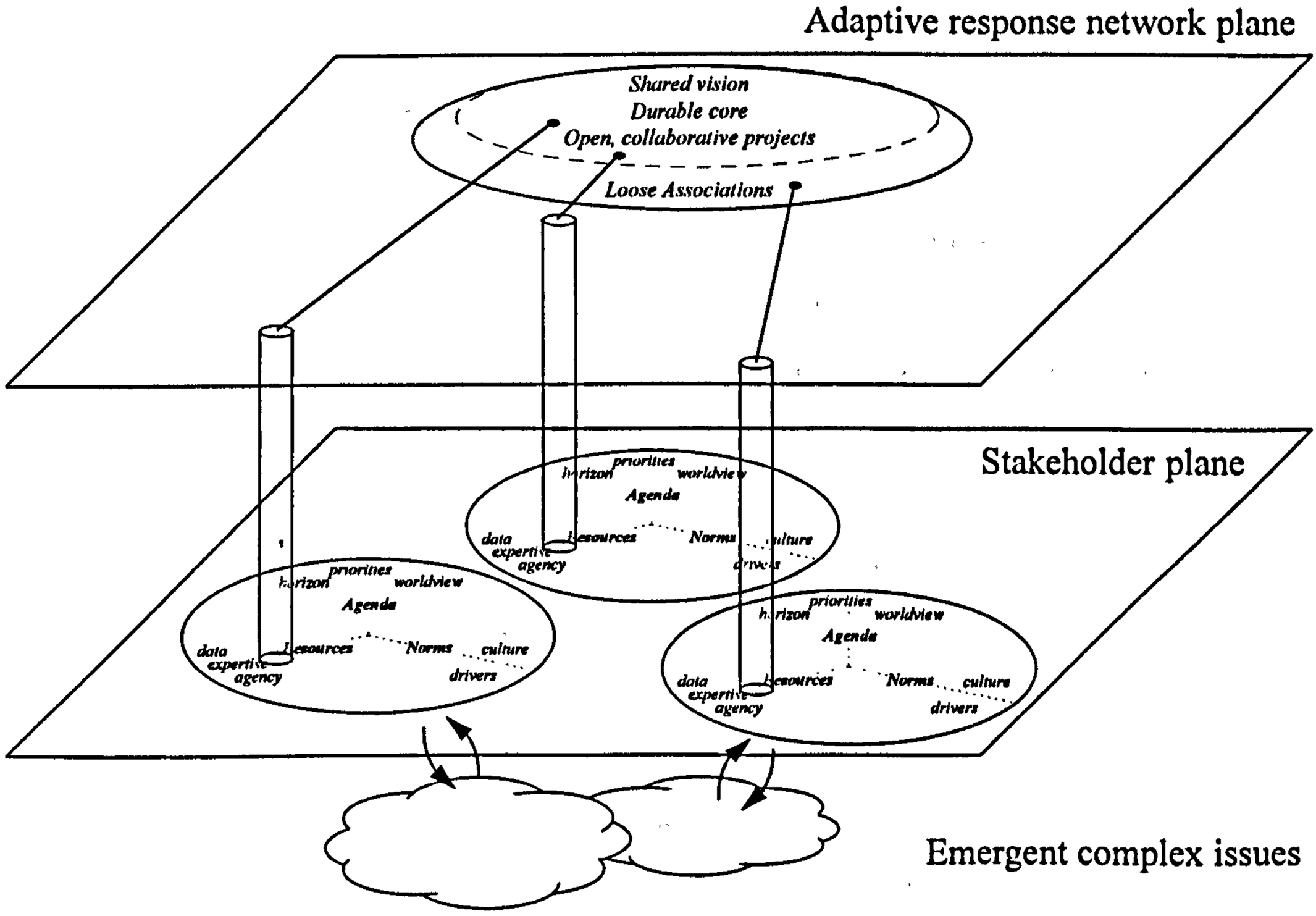

Figure 9-1 Adaptive response networks

Whilst brokers and shared information infrastructure might prove helpful in defining the core of such response networks, they are inherently dynamic and their form is far from stable.

> "... networks are as much process as they are structure, being continually shaped and reshaped by the actions of actors who are in turn constrained by the structural possibilities in which they find themselves." (Nohria, 1992, p. 7)

Indeed, the periphery of the network is as important to its conceptualisation as its core, for it is through weak ties with actors cognitively distant from the current centre that the flexibility and latent capacity for new form and self-renewal is maintained. The challenge for adaptive response networks can thus be seen as one of balancing core and periphery - in Handy's (1994) imagery, "balancing the doughnut". However, as Pascale (1990) observes, the consequences of this simple statement require a shift in thinking to appreciate fully:

> "For Westerners, balance means equilibrium. Of course, from a purely rational standpoint, one *can* have dynamic forms of balance (such as unstable equilibrium), but our associations with the term *balance* evoke images of rest and stability, not tension and instability. ... [For instance] McGregor's Theory Z isn't a static compromise between Theory X and Y. Rather, it entails being *both* X and Y over time. That's one reason balance is so difficult to see when you look for it. You can't capture it in a snapshot - it requires a movie camera. ... whenever possible I will use terminology such as *orchestrating tension* and *harnessing contending opposites* to signal the dynamic relationship between opposites that the new mindset requires." (pp. 33-34, italics in original).

Unfortunately, the form of this document prevents a dynamic (movie camera) representation of the constituitive process theory of the formation of adaptive response networks that has emerged through the fieldwork; however Figure 9-2 offers a diagrammatic framework that now integrates all the concepts developed for interpreting

actors' dealings with complex, transboundary environmental issues - it should be read with the above quote from Pascale in mind.

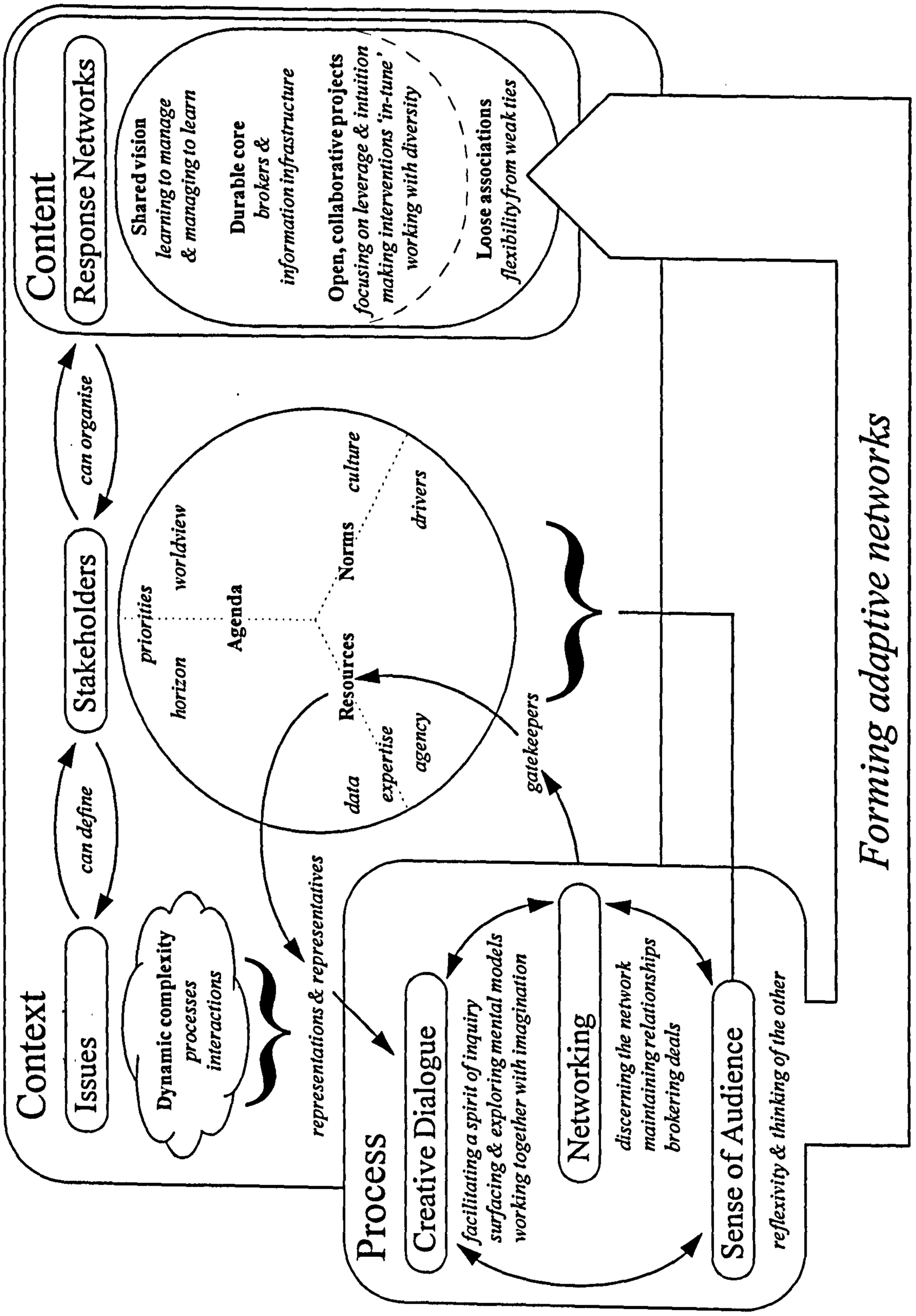

Figure 9-2 Detailed constituitive process theory for interpreting actors' dealings with complex, transboundary environmental issues

9.2 REVISITING THE INITIAL RESEARCH AGENDA

Now that all the concepts within the constituitive process theory have been articulated, it is useful to reflect upon the extent to which the research has addressed the agenda and challenges that were originally highlighted for the study (in Chapter 2). To structure this reflection it is helpful to summarise the research agenda that inspired entry into the field:

	Agenda item	Section
1	To reveal, and encourage reflection upon, mental models of environmental issues that actors use to guide their actions	2.3.1
2	To explore the extent to which actors' stakeholder classifications are in-tune with the variety they seek to categorise	2.3.2
3	To utilise a sense of crisis and the concept of paradigms in theory development	2.3.3
4	To utilise the notion of an environmental information problem as a focus for organising fieldwork activities	2.3.4
5	To explore opportunities for integrated, multi-party approaches to environmental issues	2.3.5

Whilst the adaptive research approach led to the research agenda being refined as increasing familiarity with the problem-context was gained through experiences in the field (see section 8.2.1), it is nonetheless useful to consider progress against each of the original agenda items.

9.2.1 MENTAL MODELS

With regard to the first item, the grounded approach to theory development ensured that the constituitive process theory (itself) provides a conceptual model for interpreting organisational actors' dealings with environmental issues that was resonant with the realities of the actors themselves. Also, within the theory, the aim of surfacing and

sharing actors' mental models of how their actions are interlinked with environmental phenomena, is central to the idea of 'creative dialogue'. Indeed, the composite pathways model for air quality, introduced in sections 7.3.3 and 7.3.4, can be seen as practical implementation of this. The study can therefore be deemed to have addressed this agenda item.

9.2.2 STAKEHOLDERS AND VARIETY

The second item differed from the first in that it provided impetus to the research process in the form of an invitation to a journey, rather than a destination. Indeed, it is helpful to see this item as a call for developing a heightened sense of audience with the actors themselves. In responding to this through the fieldwork, and by encouraging actors to reflect upon the adequacy of stakeholder classifications, greater clarity was brought to the concept of stakeholders than was taken into the field. In other words, Clarkson's (1995) idea of social groupings based on assumed rights or interests was expanded upon through the study. The conceptualisation of stakeholders, and particularly its constituent elements, which emerged through the study, now offers a grounded device for heightening actors' sensitivity to significant variety within relevant audiences (Figure 9-3):

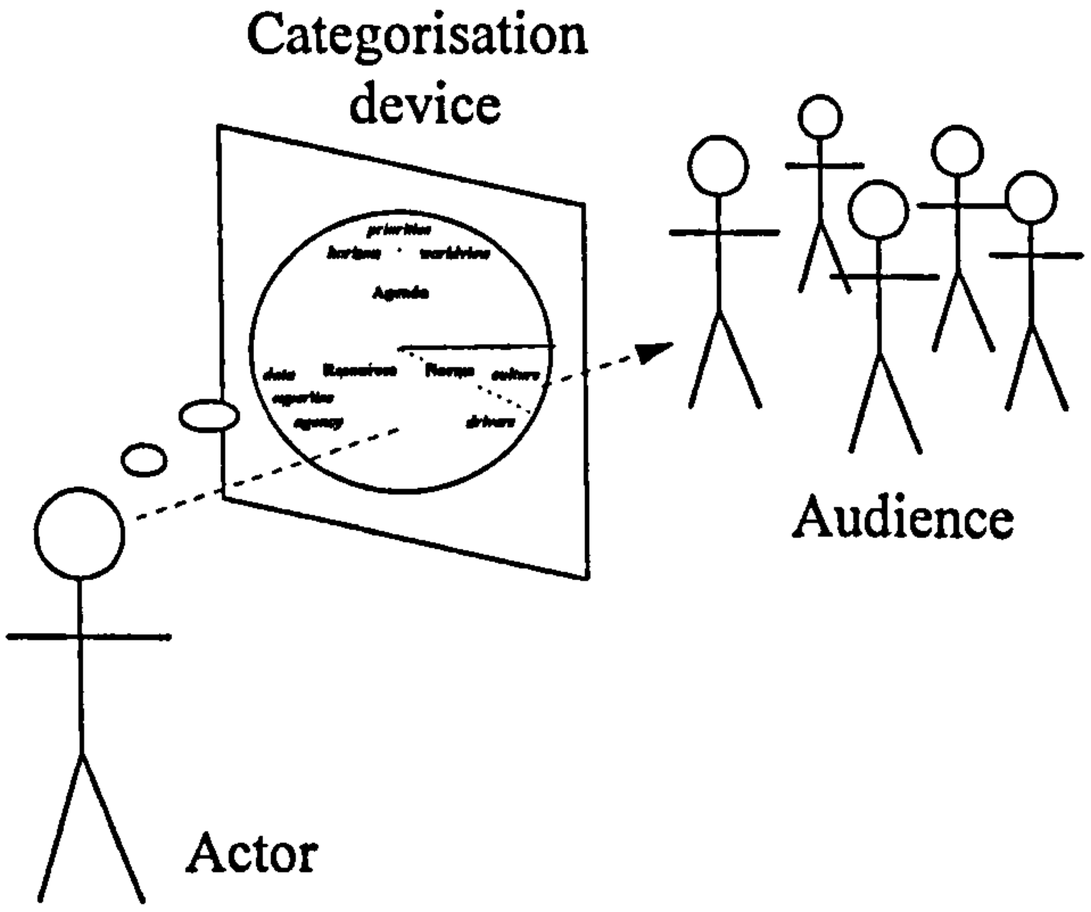

Figure 9-3 Stakeholder conceptualisation as a device for categorising significant variety within an audience

The study has therefore developed a capacity to respond to the second item, rather than addressed it directly. In other words, and to continue the metaphor that opened this paragraph, the study used the implied destination as impetus for developing a capacity for travel.

9.2.3 CRISIS AND PARADIGMS

Although in the original inspiration for the third agenda item, notions of crisis and paradigm were very much interlinked (see section 2.3.3), it is useful to consider here how the study has responded to each notion separately. The reason for this separation will become clear, but it is first important to clarify the role each notion played within the study.

With regard to the former, Zuboff's (1988) observations on the potential of a 'sense of crisis' for providing penetrating insights into otherwise taken-for-granted routine, echoed throughout the study. Indeed, the likelihood of actors experiencing a sense of crisis constituted a major criterion for discerning suitable research settings and, for each setting chosen in this way, deep reflections were elicited regarding the suitability of existing structures of knowing and doing for responding to environmental issues. These supported my initial assumption that organisational boundaries and structures were often regarded as poorly-suited to dealing with complex, environmental issues by those who worked with them. However, whilst the sense of crisis that had prompted the reflections had an obvious environmental component, it was most distinctly multi-faceted for each setting. For instance, Bedfordshire County Council was undergoing organisational restructuring with the result that its traditional boundaries were changing and its funding was falling, yet at the same time it was also recognising new environmental responsibilities.

Therefore, whilst actors readily acknowledged problems with current structures of knowing and doing for dealing with environmental issues, the study suggested that this was only one of a diverse range of concerns competing for their attention. Indeed, the study's grounded conceptualisation of a stakeholder reflects this by inviting consideration of significant variety in pertinent actors' priorities and horizons of interest and in the

drivers shaping their actions. It will become clear that the variety categorised by the concept of stakeholders, provides the rationale for separating notions of crisis from those of paradigm, when contemplating this study's contribution.

Following Kuhn (1970), and those who have tried to use his ideas beyond the setting in which they originated (see Holland, 1990), "paradigm" has been introduced as a macro-level concept for charting change in practices of knowing and doing common to a particular community. If a given community is selected - for instance organisations in the UK - then notions of audience developed in this study would suggest that the community can be characterised by significant differences in the agenda, norms and resource allocation structures of its constituents. The diagrammatic representation of the theory in Figure 9-2, suggests that against such a varied backdrop, environmental issues have not provided a focus for whole-scale reordering of that backdrop, rather they have given rise to connected structures (adaptive response networks) that are ordered on a different plane (see Figure 9-1). Individuals who assume membership of both structures may find difficulties in reconciling the two (see section 9.1.1.4 on "psychological strain"), but a possible outcome from this "creative tension" could be greening from the inside. Impetus for such greening would derive from new awareness of pertinent issues generated by participation in the adaptive response network. Returning to Giddens' (1984) work that inspired the stakeholder conceptualisation, this outcome would appear more likely if those with the power to do so, provided synergistic support along the three key dimensions through which structural change appears to be enacted. In other words, greening from the inside would benefit from the support of carefully-targeted attempts to promote greening from the outside.

In this light, Giddens' dimensions provide a helpful framework for locating current attempts to encourage organisations to become responsible for their contribution to environmental issues. Figure 9-4 shows how the dimensions can be used to position external greening pressures (Jacobs, 1991). These include environmental performance reporting, for instance eco-labelling, corporate environmental reporting, etc.; economic instruments designed to manipulate markets, such as the UK Landfill Tax or differential taxation rates on petroleum products; and environmental regulation. The examples of

modalities it includes are by no means exhaustive, however they serve to demonstrate the analytical power of the framework, particularly its emphasis on seeing each pressure in the context of the others:

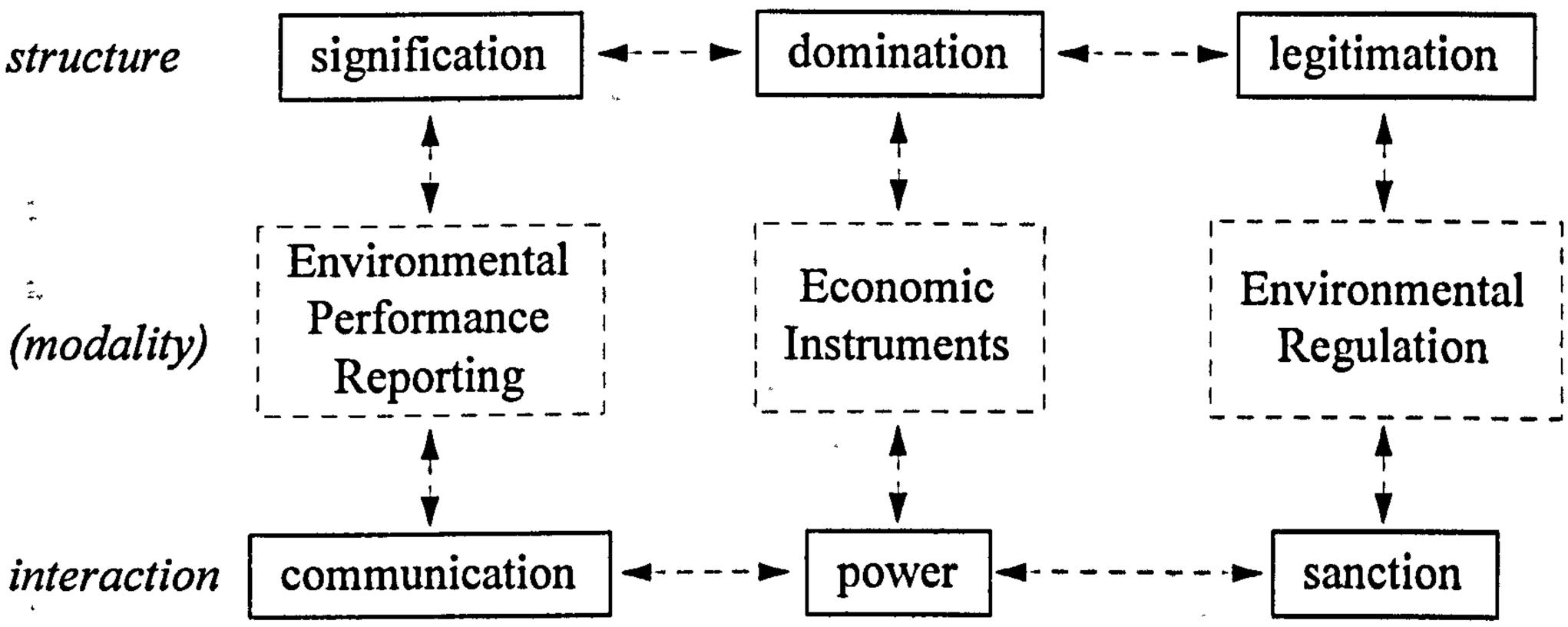

Figure 9-4 Illustrative use of structuration theory for analysing attempts to reconstitute responsibility for environmental issues within organisations

The above framework is useful for locating modalities that support deliberate attempts to reconstitute diverse organisational structures along more environmentally-sensitive lines. However, this does not represent the link between concepts of crisis and paradigm in a macro-level theory of institutional change in response to environmental issues, which was implicit in the initial research agenda. Instead, in exploring the relevance of each concept to the study, personal dilemmas, analogous to paradigm crises, have been highlighted. Such dilemmas could arise when individuals attempt to play an active role in multiple structures, each of which would enable and constrain action on environmental issues, but might be founded upon diverse (perhaps conflicting) worldviews. The nature of these dilemmas is best illustrated by an example.

Consider an individual who is part of a goal-oriented workgroup (perhaps a specialist technical department in a large organisation), who becomes involved in a transboundary adaptive response network to deal with a particular environmental issue. Such an individual may experience cognitive dissonance when trying to sustain membership of the two social networks (Granovetter, 1973). If, for the purposes of this illustration, the

worldviews that characterise the work group and the adaptive response network are termed *goal-attainment* and *sustainable development*, respectively, then Giddens' (1984) dimensions of structuration can be used to highlight particular sources of cognitive dissonance (Table 9-2):

Worldview	Agenda	Allocation of Resources	Norms	Illustrative effective action
Goal-attainment	Problem-goal	Optimal arrangement within current boundaries	Efficiency	Consensus is a destination reached by avoiding complexity
Sustainable development	Scope: relationships that need to be maintained for long-term survival	In-tune with pertinent processes	Adaptivity	Consensus about complexity is the journey

Table 9-2 Example of cognitive dissonance in worldviews

As some of the differences between the two perspectives may be regarded as subtle, an example of "effective action" (Argyris, 1993) in the arena of consensus-building is included to provide an illustrative distinction. This distinction is emphasised using the metaphors of a destination and journey respectively, to characterise the g*oal-attainment* and s*ustainable development* worldviews. Indeed, Mr Osprey's mixed metaphors for describing the challenge of developing an holistic approach to environmental issues within the diverse structures of the recently-integrated Environment Agency, illustrate well the problem of reconciling two such worldviews:

> *"... We need to pick up on the multi-functional role of the Agency ... The talk round here is of 'taking the blinkers off but not taking the eye of the ball'. If you have a multi-functional view to pick up on the interactions you might not focus on particular issues which require technical expertise ..."*

(Mr Osprey, Senior Manager, the Environment Agency)

To demonstrate further this distinction in orientation, it is useful to regard the creative dialogue workshops (undertaken in the final phase of the fieldwork) as engaging participants in interactions that gain their meaning from the *sustainable development* worldview. Consideration of the value of this exposure will be returned to later (in section 9.3); however, here, it is worth noting earlier points about fostering a latent capacity for greening from the inside.

9.2.4 A PROBLEM WITH ENVIRONMENTAL INFORMATION

This focus for the research was initially adopted for two reasons. First, it appeared to involve all the afore-mentioned agenda items; and, second, it located those items in an arena to which I could bring theoretical sensitivity developed through my experiences as an IS practitioner and academic. Furthermore, the phrase "lots of data, but little information", used to initiate entry into the field (section 4.3), appeared to provide an unifying focus, resonant with informants' realities. From the exploratory study onwards, it was apparent that research problems brought into view by this focus, were more than just technical puzzles to be solved. In other words, it is unhelpful to regard information technology as a panacea for environmental management (Stubbs M., 1996b). However, this does not mean that technology is unimportant (Law, 1991a; Walsham, 1997). Within the study, the role of technology appeared to be less one of answering questions and more one of informing the process of asking penetrating questions and exploring possible scenarios. In this way, the role appears similar to that envisaged by Allen and Bosch (1996) for decision-support technologies:

"[First] relevant existing data and information from both local and research communities [is unlocked and accessed]. This information is then brought together in a central data and information pool and structured so as to allow for its sharing and evaluation by all those concerned." (pp. 1-2)

In the terms of the constituitive process theory (Figure 9-2, p. 270), information technology can contribute to the process of bringing representations and representatives together in 'creative dialogue', and, in so doing, (re)produces the information infrastructure that characterises an adaptive response network. This grounded conceptualisation of the role of information technology in environmental management contrasts sharply with images of technology elsewhere in the literature, particularly those portraying IT as providing answers - for instance Bettinetti et al. (1996), Coombes et al. (1993), LeLièvre and Sérodes (1995) and de Pablo et al. (1994). It is thus offered as an implication from the study which opens up new avenues for further research (see section 11.2.1).

9.2.5 INTEGRATED, MULTI-PARTY APPROACHES

This item was placed on the research agenda for two reasons: to facilitate interpretation of the fieldwork, and to enable the fieldwork to contribute towards a conceptualisation of integrated, multi-party environmental management. On reflection it is clear that both of these objectives have been addressed through the study. Indeed, notions of integration and multi-party initiatives are at the very core of the theory that has been developed. In particular, the grounded concept of 'networking' can be seen as enriching Allen and Bosch's (1996) description of how relevant data and expertise are discerned for a focal land care issue:

> "The first phase ... entails an initial scoping process to clearly define the nature of the system under consideration, and the needs and opportunities facing the different interest groups that may be involved." (p. 1)

A similar observation can be made about the concept of 'creative dialogue'. Whilst Allen and Bosch's (1996) account shares much in spirit with this study, the principles for facilitating group interactions and the crucial role of imagination and creativity are clear contributions from this work:

"... the community dialogue process is designed to seek the active cooperation of participants in developing a common understanding of the context in which any individual piece of information becomes relevant. ... The ongoing community dialogue ... provides those who participated in the process with immediate access to new ideas and perspectives which may help them re-evaluate their current management practices. At the same time it helps develop a shared understanding of resource management issues." (Allen and Bosch, 1996, p.2)

Furthermore, although longer-term studies are clearly required to explore the dynamics of sustaining adaptive response networks (see section 11.2), this study's emphasis on forming temporary transboundary initiatives in response to emergent issues, opens up novel avenues for research. These lie outside those suggested by other proponents of integrated, adaptive management who concentrate on searching for appropriate institutional structures in which to house such initiatives:

"In essence the Columbia River Basin case suggests that adaptive management may be evolving away from its initial preoccupation with creating better optimisation models towards a new concern for developing institutions needed to support experimentally-driven management. Questions can be raised about whether the institutional structures of the stakeholder bureaucracies provide the flexibility needed for adaptive management, questions can be raised about the contradictions between the short terms of office and the long-term nature of the adaptive management experiments, and questions can be raised about the ability to have a neutral council when it receives its funding from a few key stakeholders. These questions are valid and need to be addressed in future research." (McLain and Lee, 1996, p. 446)

Indeed, the new territory opened up for study by this work can be likened to that revealed by notions of virtual organisations to those who are concerned with organisation structure (see, for instance Mowshowitz, 1994; and Nohria, 1992). Suggestions for pathways particularly deserving of exploration within this territory can be found later, in section 11.2.

Finally, in considering progress against this agenda item it is useful to contrast this work with a recent account of multi-party, discursive environmental decision-making that appears strikingly similar in overview:

> "... Participatory processes are needed that combine technical expertise, rational decision-making, and public values and preferences. .... One major attempt of the authors has been the organisation of round-table discourses among a wide variety of stakeholders to develop environmental policy goals or to design local and regional waste management plans. These discourses are based on the assumption that each participant can contribute to the common good if the setting of the discourse encourages the generation of shared values and discourages strategic reasoning. ..." (Renn et al., 1997, p. 218).

The method Renn and colleagues describe is based on a three level-stratification of conflict in environmental debate:

- conflict regarding knowledge and expertise - factual evidence of environmental damages, risks and potential side-effects;
- conflict regarding experience and competence - pertinent perceptions of institutional competences for dealing with environmental problems; and
- conflict regarding world views and values.

Whilst they propose different techniques for ensuring productive debate at each level, they note "a strong tendency for management agencies and companies to re-frame higher level conflicts into lower level ones", which they see as "an attempt to focus the discussion on technical evidence, in which the official spokesperson of an agency is fluent ... Citizens who participate in the discourse are thus forced to use first level (factual) arguments to rationalise their value concerns." (Renn et al., 1997, pp. 221-222). In drawing attention to this phenomenon, Renn et al. provide support for the contention that shared understanding of each other's position is not a natural outcome of debate amongst diverse environmental stakeholders. Furthermore, they develop the point to show how debates that are systematically distorted towards a technical or scientific domain can lead

to frustration and lack of involvement from those who feel their individual knowledge and concerns lack a legitimate voice therein.

Proposed strategies for dealing with this problem provide the first clear point of departure with this work. Their approach of stratifying debate can be contrasted with the 'creative dialogue' approach, which assumes that participants' definitions of relevant facts (or competencies of pertinent agencies) are inextricably linked with their individual perspective or worldview. The 'creative dialogue' approach of encouraging verbal "left-hand columning" (Argyris, 1993) in a reflexive "spirit of inquiry" (Senge, 1990) can thus be seen as an alternative method to stratification of debate. However, this does not suggest that Renn et al.'s approach is completely alien - their techniques for eliciting values through "value trees" (Keeney and von Winterfeldt, 1986), for instance, provide promising new avenues to explore in future work. Furthermore, the rich description of facilitating a "spirit of inquiry" developed in this study, can usefully extend Renn et al.'s conceptualisation of "Willingness to learn" (1997, p. 224).

The second point of departure concerns the pre-classification of participants. Renn et al. categorise participants as interest groups, experts, citizens, sponsors and a research team, whereas this study concentrates on developing a capacity for categorising significant variety within those who could be involved. Its grounded conceptualisation of a stakeholder thus enables a dynamic, situation-specific classification of potential participants, rather than supporting a predisposition towards the 'usual suspects'.

The third point of departure concerns the emphasis of the process described within the studies. Renn et al.'s work focuses on building consensus amongst key concerned parties (particularly citizens) regarding the suitability of predetermined options for environmental change. This study focuses on the process of bringing together relevant stakeholder representatives, and their representations of pertinent issues, to build shared understanding about the complexity of the issues they face, and to discern innovative interventions that are generally regarded as desirable and feasible. There are thus subtle differences in both the process and content of the approaches described in the two studies.

While both approaches clearly share an assumption that consensus about diversity is an important step in identifying desirable and feasible interventions, the following table provides a summary of their key differences. This comparison paves the way for later sections which locate the implications of this study in the mindscape of approaches to complex environmental issues (Purser, 1994).

	Renn et al. (1997)	**this study ...**
Ensuring productive debate when participants maintain diverse perceptions of environmental issues	stratification of debate - groups have pre-defined roles at different levels	facilitate a reflexive "spirit of inquiry" for all
Ordering of context	predetermined categories: interest groups, experts, citizens, sponsors and research team	concept of a stakeholder provides dynamic, situation-specific categorisation of significant variety in potential participants
Emphasis of process	evaluating predetermined options from multiple perspectives, particularly citizens	working together with imagination to discern desirable and feasible pathways for change
Content of contribution	framework for building consensus	framework for fostering adaptive responses

Table 9-3 Comparison with Renn et al.'s (1997) work on discursive methods in environmental decision making

9.3 ON SPECIFIC CONTRIBUTIONS TO THE RESEARCH SETTINGS

The following section will locate the study's general implications for the substantive theme of environmental management; however, first, it is useful to reflect upon the

specific contributions the study has made to the settings with which it has engaged. Of these, Bedfordshire County Council and Bedford Borough Council's air quality management efforts have been most strongly influenced; it is in those settings that the most intense research interactions have taken place. However, judging the 'success' of my involvement with those organisations is not easy. As section 9.1.1.5 has made clear, adaptive response networks are not always obvious as individuals' weak ties to them are as important as more obvious strong ties.

Unfortunately, the EASI-LIFE bid that the data integration project team submitted was unsuccessful. This meant that funding for the more durable aspects of an adaptive response network, such as IT infrastructure, did not become available. However, conversations with Mr Kingfisher after the results of the bid were known, indicated that its failure to secure outside funding did not mark an end to the ideas of integrating data and expertise. Mr Kingfisher explained that the process of drafting the EASI-LIFE bid had accelerated the thinking of key actors regarding ideas of integration, and that he intended to keep the ideas alive through his new responsibilities as Head of Policy Research and Intelligence. Indeed, these ideas were obvious in a recent IT strategy publication:

> "*[K]ey aspects of a vision of IT in Bedfordshire County Council have been identified:*
>
> ...
>
> ***Flexible and user-friendly access to key information from a core corporate and departmental database for managers, Councillors and other staff as appropriate.***
> *Such facilities can be considered as 'management information systems'. They will, for example, allow the extraction of data from operational systems and its consolidation into performance measures which can be presented in intelligible and useful ways (graphically, geographically etc.) or into broad current pictures of particular issues relating to establishments, functions, geographical areas, etc.*
>
> ...
>
> ***A revolution in communications within Bedfordshire County Council and between the Council, other organisations and the public. ...***

> *Systems will be put in place to allow access to information about the Council and about Bedfordshire so that staff, Councillors, partner organisations, the public and others can make informed contributions to decision making processes ...*"
> (Extract from draft Vision for IT in Bedfordshire County Council, 1997)

In addition to this consideration of the durable core of an adaptive response network it is helpful to reflect upon how the creative dialogue air quality workshops formed weak ties that could build latent capacity for the network, making 'open, collaborative projects' on air quality a real possibility for the future. Although the IT infrastructure envisaged above might well provide the focus that some participants sought for sustaining contact after the workshops (section 7.2.3.1), this does not reduce the value of the workshops themselves. Indeed, perhaps the most beneficial outcome from the NAQS and data integration workshops was a shared understanding of the desirability of collaboration and coordination of effort which emerged.

The workshops also gave participants exposure to ways of thinking and doing which gained meaning from the sustainable development perspective outlined earlier in Table 9-2 (p. 276). Although the techniques encouraged a shift away from the goal-attainment worldview, concerns grounded in this perspective continually surfaced within the proceedings. This was most obvious in the NAQS group's decision to explore "*How to manage when you're being pulled in different directions ?*" That this appears such an acute and intractable problem could be interpreted by some as the prelude to a revolution in ways of thinking and doing (see Kuhn, 1970, and section 9.2.3). However, Gareth Morgan's (1986) call to embrace the challenge of dealing with ways of seeing that may coexist in complementary or even paradoxical ways, seems to have greater resonance.

Recognising that one might be operating under a particular worldview, which has particular strengths and inherent weaknesses, is perhaps a major first step in responding to the challenges of integrated, adaptive environmental management. The techniques pioneered in the Bedfordshire workshops offered key decision-makers a brief opportunity to engage in behaviours alien to the goal-attainment worldview. Furthermore, participants recognised value in the opportunity which the events had provided for

stepping outside day-to-day roles and mindsets (see section 7.2.3.1). The extent to which that experience will change meanings of effective action (Argyris, 1993) which those individuals employ in their day-to-day activities remains to be seen; however the potential of the workshops for fostering latent capacity in an adaptive response network is clear.

9.4 LOCATING THE CONTRIBUTION

Whilst previous sections have highlighted areas in which contributions to knowledge from this work might be found, it is now appropriate to summarise those and to locate them in the mindscape of approaches to complex environmental issues, which originally inspired them.

First, the study has provided supporting evidence for its working assumption that environmental issues pose complex, transboundary problems for those who assume responsibility for dealing with them. Second, it has provided supporting evidence for its central philosophical tenet that individuals maintain diverse, sometimes conflicting, interpretations of the world around them and the processes that generate significant phenomena within it. The approach advocated for dealing with these two points is based on the belief that:

> building shared understanding from diverse appreciations of the 'same' issue amongst key actors is an important step towards discerning interventions that will be generally regarded as desirable and feasible.

This stance marks the work out as holistic, rather than reductionist, in its approach to environmental issues (Hopfenbeck, 1993; Stead and Stead, 1992). Furthermore, in proposing that complexity be revealed, rather than reduced, when formulating and assessing interventions, the approach has made integration and adaptivity central concerns for environmental management practice and theory. Support for this proposition has been grounded in the argument that routine reduction of perceived complexity, particularly through organisational compartmentalisation, myopic decision horizons and uni-disciplinary problem-solving, removes adaptive capacity for dealing with emergent

issues. However, the study has also acknowledged that such routine reduction of complexity plays an important role in maintaining ontological security (Giddens, 1984). Indeed, somewhat paradoxically, when actors are able to take for granted current structures of knowing and doing, they appear to have more 'space' for questioning the suitability of those structures. The grounded constituitive process theory from this study has thus been sensitive to a dynamic balance between reducing complexity to facilitate action within a stakeholder role, and revealing complexity to facilitate reflection upon the appropriateness of such actions and roles. This sensitivity is represented in Figure 9-2's portrayal of stakeholders and adaptive response networks in the context of one another. It is this sensitivity which makes the study's contribution to the emerging literature of adaptive environmental management particularly original.

Whilst it is clear that this study's interpretation of the challenges and opportunities for environmental management is resonant with growing calls for holistic adaptive management, at this stage in the evolution of the literature, adaptive environmental management is not a distinct concept. Therefore, a contribution of this study lies in the way it enriches conceptualisations of adaptive environmental management (such as Haney and Power, 1996; Imperial et al., 1993; McLain and Lee, 1996) with its grounded notions of 'networking', 'creative dialogue' and 'sense of audience'. However, these interlinked notions go beyond Born and Sonzogni's (1995) call to challenge the dominant metaphor of an organisation as a bounded entity, which they see as currently compromising delivery of integrated environmental management. In encouraging consideration of weak ties with key actors across traditional boundaries, and particularly in emphasising network learning, the study has revealed ways in which that metaphor can be enriched through a process perspective (Pedler et al., 1991). This grounded conceptualisation of adaptive response networks as virtual organisations demonstrates the implications of the study for the epistemology of environmental management. Moreover, in recognising that bounded and process perspectives on organisation need to enrich each other, the theory developed here for inter-weaving context, content and process goes a long way towards uniting earlier, fragmented work on networks, dialogue with stakeholders and the greening of learning (such as the 1993 Greening of Industry Conference). Furthermore, in shifting focus from organisation to network, and thus from organisation learning to network

learning, the study has developed a contribution of relevance to those dealing with transboundary issues in areas other than environmental management (see section 11.1.1).

A second substantive implication from the study arises from its notion of a 'sense of audience'. This notion has been operationalised in the grounded articulation of a stakeholder, which has been specifically developed to provide a conceptual device for categorising variety in salient individuals for a particular environmental issue. This articulation provides a level of discernment and resolution that exceeds those provided by other stakeholder definitions (particularly, Clarkson, 1995; Mitroff and Linstone, 1993; and Gray et al., 1996). There is inevitably more to a sense of audience, to thinking of the other, than just stakeholders and section 9.5 expands upon this; however, the conceptualisation of stakeholders developed in this study encourages on-going reflection upon the appropriateness of categorisations of audience. This is particularly important as dominant categorisations within the environmental management literature are often inappropriately coarse, for example, citizens (Renn et al., 1997) or pressure groups (Welford and Gouldson, 1993), and tend to be taken for granted, despite broad acknowledgment that the agenda, norms and resource allocation structures characterising such groupings are far from static. In addressing this, the study's conceptualisation of stakeholders has much in common with Granovetter's (1973) notion of cliques as significant social clusters, or, in Law's (1992) terminology, meaningful, but precarious, "punctualisations" in the networks of the social. The clarity of this grounded call for on-going consideration of audience when dealing with environmental issues is offered as a second key contribution from the work.

The third key area of contribution to the substantive theme of environmental management comes from the study's emphasis on creativity and learning, embodied in the grounded notion of 'creative dialogue'. Whilst others have conceptualised greening as a process of organisational learning (for instance, Neale, 1996; Post and Altman, 1994), this study has revealed specific barriers to individual and group learning which influence responses to environmental issues. In particular it has highlighted role-constrained learning, the constraining (as well as enabling) influence of mental models (Morgan, 1986; Senge, 1990), and the notion of "organisational defence routines" (Argyris, 1993). Furthermore,

the study has drawn attention to the potential of synectic techniques, particularly metaphor (Gordon, 1961; Morgan, 1993; Rickards, 1990), for dealing with those barriers and, in so doing, has opened up a pathway for environmental management practitioners and researchers to engage in conversation about less constrained futures.

Therefore, with regard to the practicalities of dealing with complex issues, 'networking', 'creative dialogue' and a 'sense of audience' are offered as key contributions to the substantive theme of environmental management.

Finally, this section would not be complete if it did not highlight implications from the study for the process of researching environmental management. Although this will be explored in greater detail in the following chapter, it is important to note that the study's constituitive process theory of adaptive environmental management offers an original contribution to the debate about linking the content, context and process of environmental management (see section 2.4.3). In identifying structuration theory as a framework for supporting this linkage, Giddens' (1984) work is not presented as the "only wheel in town" (Webb and Salancik, 1966, quoted in Hammersley and Atkinson, 1983). Instead, it is presented as a useful framework for linking social action with the structures in which it is embedded. The strengths of the framework for environmental management lie in its handling of routine, its consideration of the dimensions of stability and change, and its call to researchers to recognise that they too must manage their relationships with the world they choose to study. However, the language of sociology is often criticised for explaining the mundane in terms of the obscure and these criticisms must be addressed if environmental management research is to be conducted with a genuine sense of audience (Goodey, 1974; Conrad, 1995; Underwood, 1995). The implications of this contribution will be explored further in the following chapter, however, it is nonetheless important to note the study's contribution to a central debate within the literature of environmental management (Räsänen et al., 1994).

9.5 ON THE LIMITATIONS AND TRANSFERABILITY OF THE EMERGENT THEORY

Although the study's grounded approach, particularly the integral role that feedback has played in theory development, argues strongly for the empirical fidelity of the work, following the principle of reflexivity inherent in Law's (1994) modest sociology, it is appropriate to reflect upon the limitations and transferability of the theory developed herein. Indeed, such reflection is essential for facilitating the use of the theory by others, elsewhere, and is consistent with the central guiding principle of a 'sense of audience'.

Time and resource constraints on a part-time researcher inevitably place practical limitations upon opportunities for first-hand contact with research settings, and thus are obvious constraints upon theories that emerge. However, of equal importance to first-hand contact is the researcher's theoretical sensitivity and method for applying it to develop theory. That a researcher's blend of field experiences, method and theoretical sensitivity will result in partial insight is inevitable. From the philosophical stance of this work there can be no perfect, absolute picture of how things are. Instead, productive debate centres around the extent to which insights are well grounded, and likely to be of use beyond the settings which inspired them.

Whilst the next chapter provides my contribution to Morgan's (1983) "conversation" about researching complex issues, the remainder of this section can be regarded as caveats on the theory developed herein. Points selected for inclusion are driven by a dialogue set up between my sense of audience - assumptions I have about who might find the theory useful and for what purpose - and my awareness of the insights which inspired theory development. To question whether the list is exhaustive would be missing the point. I sincerely hope that others will critique the theory developed here and, in so doing, enrich the theory with contributions from perspectives other than my own.

As it is unhelpful to conceive of theory as right, just more or less useful (Law, 1994; Walsham, 1993), a first caveat on the use of the theory developed in this study would concern its conceptualisation of stakeholders. The model developed within the study was

grounded in actors' dealings with complex issues, illuminated, particularly, by Giddens' (1984) theory of structuration. It thus emphasised stakeholders as people and the theory on which it is built is open to legitimate criticism of human-centrism, particularly if it is to be applied to environmental issues involving non-human stakeholders, such as wildlife. However, a partial response to this criticism comes from the sense of audience thesis. Although not articulated with the clarity of the stakeholder concept, the principle of considering all those affected by, and affecting, environmental issues, invites contemplation of voiceless others, eg wildlife. An important caveat would therefore be: do not take the stakeholder conceptualisation without taking the sense of audience thesis.

A second caveat would concern the focus of the study; in particular, the constituitive process theory is offered as a means of interpreting the formation of adaptive response networks. As the LIFE bid described in the central study was unsuccessful, opportunities did not arise for first-hand exposure to the realities of sustaining an adaptive response network. However, to respond to this lack of first-hand research data, appropriate literature (such as Granovetter, 1973, and Giddens, 1991) has been identified and analysed in order to assist speculation about possible futures. Although not a direct mapping, it is useful to contrast the adaptive network formation theory with stage models of groups, such as Tuckman (1965)'s "forming, storming, norming, performing". In so doing, the caveat here becomes clear: this theory is about forming adaptive networks; more research is required on sustaining them. An agenda for such research will be set out in Chapter 11.

A third caveat would concern limitations on the medium used for sharing the constituitive process theory. As section 9.1.1.5 has indicated, static textual accounts of dynamic processes are poorly suited to reflecting mutual causalities contained therein. This document has included several diagrammatic attempts to address these limitations but, whilst original, these are again static. It is therefore important to reiterate that the thesis and its supporting theory should be read with Pascale's (1990) shift in thinking, from static to dynamic appreciations of complex situations, in mind.

9.6 SUMMARY

This chapter has refined the study's conceptualisation of adaptive response networks and positioned it in a grounded constituitive process theory for interpreting actors' dealings with complex environmental issues. The emergent theory has been reviewed against the research agenda that inspired it and its contributions to the substantive theme of environmental management have been carefully located. Key areas of contribution coincide with notions of 'networking', 'creative dialogue' and 'sense of audience', and the study also contributes to a core debate within the environmental management literature about frameworks for linking the content, context and process of 'greening'. Finally, the chapter concludes by identifying a number of caveats concerning use of the theory. The following chapter now examines the methodological contributions from the study.

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10. EVALUATING THE METHODOLOGICAL CONTRIBUTION

This chapter first reflects upon how the study has responded to the methodological challenges highlighted as particular problems for studying environmental management, in Chapter 2. It then reflects upon the methods used, the methodology followed and the philosophical stance that drove the research process, highlighting where specific contributions to knowledge might be located at each stage.

10.1 ON A CONTRIBUTION TO RESEARCHING ENVIRONMENTAL MANAGEMENT

In considering useful contributions from this work, it is appropriate to reflect upon how specific methodological challenges, highlighted in the literature survey, were addressed in the fieldwork. To structure this reflection it is helpful to summarise those challenges:

	Methodological challenge	Section
1	Transcending traditional disciplinary boundaries	2.4.1
2	Being aware of one's role in shaping the world being studied	2.4.2
3	Identifying theory for linking the content, context and processes of environmental management	2.4.3

10.1.1 TRANSCENDING TRADITIONAL DISCIPLINARY BOUNDARIES

In considering how the study has responded to this challenge, it is difficult to underestimate the role of 'process' as a core epistemological device. It is this emphasis that has provided the study with a means, and an incentive, to transcend disciplinary boundaries. For instance, fieldwork activities have endeavoured to bring into the open pertinent individuals' mental models of dynamics they consider relevant to the issue in focus, irrespective of the organisational or disciplinary perspective of the individuals involved. Indeed, sharing insights across such boundaries provided the rationale for the creative dialogue workshops that constituted the culmination of the fieldwork.

The study's approach to transdisciplinary inquiry can therefore be described as one of stimulating reflection, and thus hopefully learning, by constructing representations of pertinent aspects of individuals' realities - past, present and future - that can subsequently be exposed to imaginative critique from diverse perspectives.

In the tradition of the constant comparative method of grounded theory, primary and secondary research data shaped the development of, and were informed by, theoretical sensitivity that was not limited to a single discipline. In other words, insights from multiple disciplines were illuminated by theory from multiple disciplines (for an illustrative review see section 10.6). **Figure 7-2**, p. 236, provides a graphic illustration of a focus used to stimulate such activity - a composite pathways model. Section 10.2.2 will provide more detail on the methods used to achieve this, but, when the purpose of the endeavour is phrased as above, resonance with soft systems thinking is clear (see Checkland, 1981, and Lemon and Longhurst, 1996).

To clarify this study's relationship with soft systems thinking, it is useful to contrast it with Hindle et al.'s (1995) multidisciplinary action research within the National Health Service. Their account describes how specific concepts from soft systems methodology - holons, root definitions and CATWOE analysis (reviewed in section 5.3.2.1.1) - were used to integrate the diverse approaches of a team of researchers from different disciplines. These concepts are presented as a common language in which researchers articulated their understanding, and planned and evaluated their interventions. This marks a point of departure between the two studies. In this study the need for a language that could transcend disciplinary boundaries arose primarily from a single researcher attempting to integrate informants' diverse perspectives; whereas in Hindle et al. (1995)'s work, the major impetus appeared to stem from a desire to integrate diverse perspectives within the research team. Whilst root definitions and CATWOE analysis were also used for contemplating interventions in this study (see sections 5.3.2.1.1 and 7.2.3.2), they did not drive the research process in the way Hindle and colleagues describe. Instead, notions of process and networks fulfilled that role. Here, it is interesting to note that informants from Bedfordshire County Council who worked with both sets of concepts, claimed that pertinent knowledge could be more readily expressed in terms of networks and processes,

than in holons and root definitions. Whilst this is only a small group of individuals and it is easy to explain away their reaction as a consequence of the way the ideas were introduced to them, a more open interpretation could portray this as a challenge to the dominant, if tacit, assumption that the language of soft systems methodology is somehow universally understood (see, for instance, Burrell's, 1983, review of Checkland's, 1981, text). This point is noted here for completeness but to explore it further would be outside the scope of this section.

Whilst concepts within a systems frame have been used extensively within this study, they have not been the exclusive frame of representation for pertinent aspects of individuals' realities. Indeed, the deliberate search for novel frames to appreciate complex situations has been an emergent characteristic of the fieldwork, developed particularly through the 'creative dialogue' workshops. Whilst contributions from this approach are considered later (in section 10.2.3), it is useful to note its role in complementing concepts of process and networks for transcending disciplinary boundaries.

10.1.2 BEING AWARE OF ONE'S ROLE IN SHAPING THE WORLD BEING STUDIED

Throughout the fieldwork the research framework developed in Chapter 3 structured the attention which I gave to my interactions with the world being studied. The framework's emphasis on constant interplay between four key research objectives, rather than a simple linear progression, ensured my sensitivity to the audience for my actions, both in the immediate research setting, and beyond. In other words, the framework encouraged me to reflect upon what had passed and to consider possible futures both in the field and away from it. Chapters 4 through 7 offer rich accounts of such audience-inspired contemplation, but it is useful to illustrate the point here with an example. In considering what role to adopt in the NAQS workshops, I had to organise the impressions I had formed about individuals who would be attending and anticipate and evaluate futures that potential role options would open up, particularly for gathering data, generating theory and communicating findings. As this example makes clear, maintaining, being informed

by, and responding to, a sense of audience for one's research actions is not a trivial undertaking. However, the research framework offered useful structure to the endeavour.

Although the framework proved useful, my experiences in the field supported Giddens' (1984) observation that no matter how hard one works at maintaining an acute sense of audience for one's actions, unanticipated and unintended consequences are inevitable. For instance, when I provided Mr Kingfisher with copies of academic papers, I did not foresee some of the authors becoming transnational partners in an EU funding bid (section 5.4.1.2). However, following the 'sense of audience' principle, each unintended or unexpected consequence of my actions was regarded as a source of new insight, an opportunity for learning. In this regard, on-going development of a sense of audience can be likened to an action-research project (Susman and Evered, 1978). In the example mentioned above, the unexpected consequence of my participative approach to developing theoretical sensitivity, caused me to recognise that my actions were having effects that spread beyond the confines of Bedfordshire County Council. I thus broadened my sense of audience, now recognising that significant interactions might involve actors who were on the extreme periphery of what appeared to the main focus of activity. This revised awareness shaped my subsequent actions, and informed my emerging conceptualisation of adaptive response networks. This example provides further support for the dynamic conceptualisation of research that underpins this work. In short, the study reinforced its premise that being aware of one's role in the world being studied is best described as an on-going process of developing and maintaining a sense of audience for one's actions, rather than a one-off event.

10.1.3 LINKING CONTENT, CONTEXT AND PROCESS

Section 2.4.3 speculated that a major part of this study's contribution to knowledge would stem from the way in which it dealt with the current lack of a recognised framework for linking the content, context and process of environmental management initiatives. An analogy drawn between the challenges faced by environmental management and IS researchers first suggested a possible solution space in this regard. This initially appeared to contain two candidate frameworks - systems theory and structuration theory - although

actor-network theory also entered the arena as IS researchers struggled to capture the special nature of technological artefacts in IS initiatives (Walsham, 1997). Following Gordon (1961), a "tenuous point of connection" between the two areas of academic endeavour was used to explore possibilities for a framework with which to locate and link salient environmental management concepts. What emerged can best be described as a hybrid that was grounded in a sense of the environmental management research and practitioner audience developed through the study.

Actor-network theorists argue convincingly for the importance of describing the network of relationships considered pertinent to an investigation. Furthermore, they offer a notion of "punctualisation" - meaningful simplifications of the networks of the social - which provides a mechanism for "black-boxing" the complexities of such networks into "actants". That such "punctualisations" are recognised as precarious, and might seem more or less so from the perspectives of different actors, fits well with the turbulent, pluralist world of environmental management. Indeed, the tendency in the literature towards simplifying the multitude of influences affecting organisations' environmental initiatives into categories of stakeholder pressures, seemed particularly resonant with the notion of revealing key actants (although actor-network theorists would, of course, highlight the precarious nature of such simplifications). The notion of 'punctualisation' therefore provides a helpful way of considering pertinent attributes of the context in which a particular environmental initiative takes place. Furthermore, following the 'sense of audience' principle, the project becomes one of revealing 'punctualisations' in use by the actors themselves so that their stability from different perspectives might be assessed. But what then of the process whereby such 'punctualisations' became more or less stable ? How were those aspects of context taken for granted ? Giddens' (1984) structuration theory suggested that an answer lay in routine.

Structuration theory and actor-network theory come together in a constituitive theory of social ordering. In other words, "the social is better seen as a recursive process, rather than a thing." (Law, 1994, p. 14). It is the routinisation of self-generating processes that leads to emergent attributes appearing stable (Giddens, 1984). However, this does not make their identification of little importance. Instead, it calls for recognition that

particular emergent attributes are being usefully taken for granted, rather than suggestions that they are fixed attributes of society.

> "Look at it this way: the social is a set of processes, of transformations. These are moving, acting, interacting. They are generating themselves. Perhaps we can impute patterns in these movements. But here's the trick, the crucial and most difficult move that we need to make. We need to say that the patterns, *the channels down which they flow, are not different in kind from whatever it is that is channelled by them.* So the image that we have to discard is that of a social oil refinery. Society is *not* a lot of structural pipes and containers that were put in place in place beforehand. Instead, the social world is this remarkable emergent phenomenon: in its processes it shapes its own flows." (Law, 1994, p. 15)

Following this perspective, a constituitive process theory (Walsham, 1993) is thus a story of ordering, of how content emerges from the process of ordering context. This does not imply that content and context are different things (Callon and Law, 1989). Each is regarded as an emergent attribute of a process of ordering. However, content refers to the emergent attributes of a process of ordering that is in focus; context refers to the emergent attributes, from previous orderings, that give rise to that process. In this way, context is resonant with Kling's "lay definition of ... something larger that gives meaning to the topic in focus" (1987, p. 315). The essence of the interrelations between context, process and content is captured in Karl Marx's often-quoted phrase:

> "'Men [let us immediately say human beings] make history, but not in circumstances of their own choosing.'" (Giddens, 1984, p. xxi)

Thus, to reveal context one must ask actors who see themselves part of that focal process: 'what is it that influences you ?'; and, to reveal content, one must ask the same actors: 'what is it that is being formed here ?' This implies that process is being used as an epistemological device for linking perceptions of pertinent phenomena over time and across space.

When seeking to reveal pertinent attributes of a process of ordering, Giddens' (1984) structuration theory proposes dimensions along which context is reordered through action (see **Figure 5-4** and **Figure 9-4**). Within the study, awareness of these dimensions drew attention to synergistic clusters of actions - 'networking' and 'creative dialogue' - that appeared to be producing emergent content - 'adaptive response networks' - from the context of issues and stakeholders. The grounded approach to the fieldwork also indicated that these synergistic clusters of actions were interlinked with a mutually-informing sense of audience; this was subsequently represented as the third characterising attribute of the focal process. In this way, the distinction between content, context and process provided a map for locating core concepts and their interrelationships (see **Figure 8-2**). Within the limitations imposed by a static diagram, this map attempts to chart change: content emerging through process from context. It is thus visibly similar to systems representations of output, process and input.

Whilst the fieldwork focused upon studying change - the formation of adaptive response networks - it is equally valid to study how it is that the status quo is maintained (Law, 1994). In such circumstances content and context can be considered the same and the process at work is often described as "self-fuelling" (Argyris, 1993), maintaining the status quo by routinely reproducing the context that inspired it. The content, context, process (constituitive process theory) model may suggest an orientation towards the study of change; however, as context and content are only distinguished as pertinent antecedents and outcomes of a focal process, the concepts which underpin its construction are equally suited to studying ways in which the status quo is maintained. As concerns about both the status quo and change feature regularly in environmental management debates (see Chapter 2), constituitive process theories appear particularly well-suited to making contributions in this arena.

At this stage it is equally important to clarify what such theories are not contributing. They are not claiming to explain the way things are everywhere. As the preceding paragraphs have made clear, representations of context, content and process reflect emergent phenomena defined in terms of one another; a constituitive process theory can therefore only be judged on its empirical fidelity, coherence and usefulness. It is

meaningless to say that it is correct. It too is an outcome of a process of ordering - the research process - and is therefore a precarious representation of aspects of a dynamic world. If the 'sense of audience' principle is followed, then a researcher is encouraged to develop and critique emergent theory from the perspectives of others. Such exposure can contribute to the durability of simplifications drawn in the theory, but this does not make them correct. Following the philosophy of this work, attempts to assess the validity of the emerging ideas concentrate on exploring the extent to which they are useful and with whom, rather than seeking statistical proof. Maybe, through exposure via relevant journals and conferences, and through routine use in analysing environmental management situations, the constituitive process theory developed in this study will become taken for granted in the general mindscape of environmental management ideas, but this would not make it correct; the simplifications within it are still acknowledged as being precarious. Being mindful of this is in keeping with Law's "modest sociology" (1994).

The previous paragraphs have demonstrated how the study has developed an original synthesis of actor-network theory, structuration theory and systems theory in order to address a central challenge for the study of environmental management: the ability to link pertinent aspects of content, context and process in a theory that can illuminate both stability and change. The study has expanded upon Walsham's (1993) conceptualisation of a constituitive process theory, developing its capacity as a vehicle for sharing knowledge in the environmental management arena. Furthermore, this development has been more than just a theoretical exercise; it has been grounded in efforts to interpret and organise ideas that emerged as particularly salient during several years of participative fieldwork. Indeed, the conceptualisation of a constituitive process theory articulated here is demonstrated in the previous chapter's offering for interpreting actors' dealings with complex, transboundary environmental issues (**Figure 9-2**), and later in the representation of the process of researching complex issues itself (Figure 10-4). The study's response to this methodological challenge is therefore submitted as a substantial, original contribution to knowledge on the grounds that it advances debate about the philosophy and practice of environmental management research and demonstrates a new agenda to those who wish to develop the field further: the agenda of constituitive process theories.

10.2 ON METHODS

10.2.1 GUIDED CONVERSATION AND FOLLOWING NETWORKS

Whilst at this point other studies might reflect upon the limitations of their questionnaires or similar research instruments, this section reflects upon this study's primary data-gathering method alongside the encounter strategy used to identify promising data-gathering episodes. As the section will make clear, the two are considered together as each informed the other and to consider them separately would be incongruent with the emergent nature of adaptive research, presented in Chapter 3.

First, it is important to note that the combination of data-gathering through guided conversation (Lofland, 1971) and the encounter strategy based on principles of snowballing (Arber, 1993), data triangulation (Denzin, 1970) and theoretical sampling (Strauss and Corbin, 1990), provided flexibility for following and articulating the network of actants that informants regarded as pertinent. However, in the hermeneutic tradition (Blaikie, 1993), my appreciation of the phenomenon being investigated, my strategy for choosing sources with which to interact, and my agenda for guiding conversation with actors whom I encountered, were all constituent, interlinked elements of a complex whole (Figure 10-1):

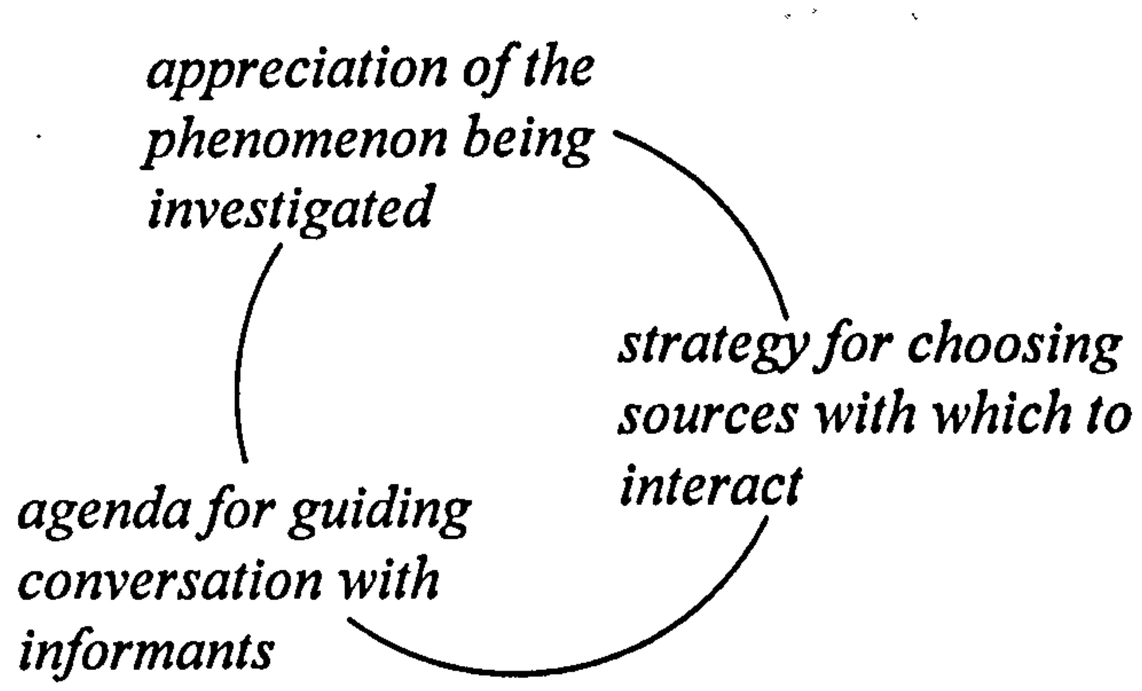

Figure 10-1 A hermeneutic relationship

The research framework developed in Chapter 3, and reviewed later in section 10.3, offered structure to the process of dealing with this hermeneutic relationship. In following the framework in the field, the notion of a guiding vision of the research outcome became instantiated with my desire to develop a meaningful simplification of the complex socio-technical networks that influenced, and were reordered by, actors engaged in the process of dealing with transboundary environmental issues. This guiding vision was grounded in my assumptions about the needs of a research and practitioner community interested in dealing with complex issues. In other words, it was shaped by my sense of audience. This guiding vision enabled the vicious circle, arising from viewing the elements in Figure 10-1 in a simple, linear model of causality, to be transformed into a virtuous one. Within the study, each element gained meaning from the others, leading to an emergent research agenda and encounter strategy (demonstrated graphically in **Table 8-1**). However, without such a transformation, and the 'sense of audience' principle that inspired it, it seems likely that the study's methods of guided conversation and following networks would be time-consuming, frustrating and unproductive. Indeed, the flexibility that suits this study's participative and adaptive approach to research, is likely to pose serious problems to other, more linear, genres.

Although reflection upon the twin stories of dealing with research and environmental issues has been divided into different chapters, it is apparent that the study's grounded conceptualisation of networking - *discerning and engaging those capable of contributing to understanding and action on a focal issue* - would find resonance with the challenges and opportunities described above. Indeed, Figure 10-1 usefully characterises much of the challenge of networking. Furthermore, in highlighting the critical role that a 'sense of audience' played in responding both to the challenges described above, and to the challenges of networking (see, for instance, sections 5.4.2.2.4 and 7.1.1), this document has presented supporting evidence for the central thesis in each of its stories.

In short, the study has demonstrated that guided conversation and following networks can provide the flexibility necessary for investigating emergent issues, but dealing with such flexibility is central to managing both the research process and the issues themselves.

10.2.2 SOFT COMPLEX SYSTEMS REPRESENTATIONS

As earlier sections have made clear, the use of systems concepts to elicit and explore those aspects of individuals' mental models that pertain to a chosen focal issue, has been a particular feature of this study's methods. Whilst those systems-oriented research activities have already been described and reviewed from an operational perspective (sections 7.3.3 and 7.3.4, for instance, have considered the design and deployment of the composite pathways tool), it is now appropriate to reflect more deeply.

Following the philosophy of a socially-constructed world, the study has endeavoured to recognise systems concepts as epistemological devices, means for interpreting complexity. In this regard, the study follows Checkland's calls for "soft" systems thinking. However, it departs from his efforts to foster a divide between the "technical" systems thinker and the lay-person. In his (1992b) call for "scholarship", Checkland advocates the use of Koestler's more obscure language of 'holons' to preserve the purity of holistic systemic thinking that he sees as being "shop-soiled" by every-day appropriations of the word system. But, in the socially-constructed world that Checkland claims to be representing, a pure, incorruptible meaning is impossible, unless it stands for some immutable ontological feature. And, if that is the case, then Checkland is contradicting his claim that systems are not a feature of the real world. Although he accepts that 'holon' could eventually lose its insight, his desire to place systems thinking on a pedestal, to prevent it from being "soiled" by every-day use, provides the point of departure for this study's use of systems concepts.

Following Morgan (1986) and Kittay (1987), it seems reasonable that insightful metaphors, like that of a system, would lose their novel way of seeing as they become widely used. Indeed, the more insight they offer, the greater the likelihood of their widespread use. Such a phenomenon would appear to be both advantageous and disadvantageous. Its novelty value might wane, but as a metaphor becomes more widely used it would seem to offer a common device with which to organise insights. Here the point of departure with Checkland becomes clear. It was precisely because they were widely used by lay actors that particular systems concepts - notions of process and

boundaries - were used in the field to capture insights. However, it is dangerous to assume that any metaphor will be interpreted in the same way universally (Morgan, 1996). Therefore, in the study, those epistemological devices were used in situations that attempted to maintain Senge's (1990) climate of a "spirit of inquiry": a reflexive awareness of differences in interpretation which creates impetus for learning. This climate resonates with Checkland's notion of scholarship but does not seek to maintain a distinction between academics and the object of their study.

Whilst Senge's (1990) text might not take as much care as Checkland (1992b) in distinguishing systems as an epistemological device, its emphasis on revealing dynamics pertinent to the understanding of complex phenomena is no less useful, particularly as it appears alongside a "spirit of inquiry" in his conceptualisation of systems thinking. Although it does not highlight the reflexive climate that was critical to operationalising these ideas in the study, Seaton's (1997) notion of "soft complex systems" goes a long way towards reflecting the synthesis of Checkland's and Senge's works that inspired the fieldwork. In particular, it provides a useful label for classifying the composite pathways exercise which also enables other similar techniques to be identified - for instance, Eden's cognitive mapping technique, described below by Swan (1995):

> "The approach starts with the premise that action arises out of people's interpretation of the meaning of situations, and that the same situation can be interpreted differently by different individuals. Producing a cognitive map for the individual will facilitate that person's understanding of their own meaning system and enable them to see areas where they might be able to change or influence events. The person will be able to reflect upon their own system of interacting concepts that make up the problem area being addressed. Individual maps for the group of people are then merged. The aim of the merged map is to produce a facilitative device that promotes psychological negation among the members of the group so that they can come to a consensus on the definition of the problem, key concepts relating to the problem, relationships among these concepts, and areas of strategic intervention." (p. 1265)

The label of "soft complex systems" invites the role of computer modelling, as well as cognitive modelling, to be revisited, particularly in the light of Senge (1990) and Kim's (1993) accounts of how "microworlds" provide a focus for eliciting and sharing understanding. This will be returned to in the final chapter when an agenda for further work is laid out.

10.2.3 METAPHOR

If the methods of this study are compared with those in other accounts of environmental management research, then metaphor stands out as perhaps the most unusual feature. Although metaphor shapes much environmental work, its role in shaping and creating knowledge has so far been largely tacit and, as a consequence, underdeveloped (Jeffrey, 1996). Whilst models have been a well-trodden track in environmental management research (see Chapter 2), the neglect of metaphor seems strange in the light of Mihram and Mihram's (1974)'s conclusions:

> "Models and metaphors are the 'speculative instruments' by which human knowledge evolves." (p.56)

This study has attempted to address this neglect by emphasising explicitly the cognitive force of metaphor, rather than its role as an ornament to language (Kittay, 1987). In this regard, its use of metaphor is closely aligned with the work of Morgan (1993), although it was inspired by Rickards (1990) and Gordon (1961). Its use within the field, first in the central study (section 5.3.2.1.1) and then in the NAQS workshop (section 7.2.3.1), involved a search for novel metaphors for complex issues. This search was undertaken in the hope that it might lead to novel appreciations. The rationale was thus to create novel appreciations through the mechanism outlined below:

> "... metaphor results in an object being placed in two perspectives simultaneously. From this juxtaposition results a reconceptualisation, sometimes permanent, more frequently transient, in which properties are made salient which may not previously

> have been regarded as salient and in which concepts are reorganised both to accommodate and to help shape experience." (Kittay, 1987, p.4)

Whilst the study made particular use of the opportunities for creativity inherent in juxtaposing domains that had previously been considered separately, for instance, developing an integrated environmental information system and getting a dysfunctional family to complete a Christmas jigsaw (section 5.3.2.1.1); metaphor also offered a mechanism for transcending disciplinary boundaries:

> "[Metaphor] is the paradigmatic device for pointing out analogies and making comparisons which cross the boundaries of our usual categories and concepts."
> (Kittay, 1987, p. 19)

In the field, this enabled suggestions to emerge that were unconstrained by disciplinary boundaries. For instance, when the problem of targeting effort on air quality was explored through the metaphor of targeting a weapon, suggestions related to marketing public health messages were made by transportation planners, and an environmental health officer with knowledge of epidemiology invited that marketing domain to be reconceptualised as biological infection (section 7.2.3.1).

Furthermore, when used in the field, metaphor helped to foster a central characteristic of 'creative dialogue', a climate of reflexivity and sensitivity to perceptual diversity (Senge's "spirit of inquiry"). In this climate, a shared awareness of salient aspects of each other's position was generated in a relatively short period of time. Although section 8.1 reflects upon this, it is useful here to note resonance with Morgan's (1996) observations on the special nature of metaphor:

> "The inherent 'falsity' of metaphor also encourages a healthy scepticism in the way we view knowledge, and opens social constructions of reality to the kind of continuous deconstruction and construction for which many postmodernists call. Metaphor is truly postmodern, because the dialectical tension between truth and falsehood implied in any metaphor demands a self-critical form of imagination and understanding.

> Metaphor is both evocative and tentative. Those who understand its role and functioning in the creation of knowledge are obliged to be consciously aware of this, and the blindspots and biases that use of metaphor creates." (p. 234).

The fieldwork has reinforced Chapter 2's highlighting of the pluralist and apparently intractable nature of many environmental issues. In particular, though, it has demonstrated that the special characteristics of metaphor make it a device well-suited to creating a climate for responding to those issues, from research and management perspectives alike.

10.3 ON METHODOLOGY AND MANAGING RESEARCH

It is now appropriate to reflect upon the methodology adopted for the research study and to consider its particular strengths and weakness for studying complex issues in an (inter)organisational context. Although Chapter 3 has articulated the philosophy that influenced the research process, and developed a guiding framework which subsequently shaped the research study, it is important to reiterate that this framework was designed to support a process model of research. More specifically, it was designed to support a constituitive process model of research, rather than a linear model. In other words, planning and design are seen as dynamic, ongoing and mutually-informing activities, rather than discrete sequential events. Such a conceptualisation of research places emphasis on adaptivity and emergence, points resonant with Law's account of the research process:

> "Garfinkel's point about the documentary method is well-made. It points to the way in which research ... is a process, a reflexive process of uncertain and provisional imputation. It points to the ordering process in which we weave to and fro between traces and imputations. It speaks of the process which generates a sense of pattern, and with that, a series of 'decisions' about what will count as warrantable simplifications and translations - what, in other words, will count as 'data'. And it admirably points to the iterative or emergent character of the process of ethnographic ordering."
> (1994, p.50)

As a common framework was used throughout the fieldwork, the emergent nature of the research agenda within this study can readily be seen in stark relief (see **Table 8-1, p.** 247). Furthermore, the iterative nature of the endeavour is reflected in the unorthodox appearance of several literature surveys within this document. Although the linear mode of a textual document inevitably constrains accounts of research in the ethnographic tradition (Hammersley and Atkinson, 1983, p. 212), the structure of this document has been designed to suggest something of the mutually-informing relationship between data and theory that shaped the study. In short, the text seeks to demonstrate principles of adaptivity and audience in both its content and structure.

10.3.1 A STORY OF ADAPTIVE RESEARCH

The literature survey in Chapter 2 developed an initial research agenda for the study and highlighted methodological challenges; these were responded to in Chapter 3. The framework developed therein was subsequently employed consistently throughout the fieldwork as a structuring device. In attending to the research objectives highlighted by the framework, each fieldwork phase revealed anomalies and puzzles that inspired forays into the literature. Such forays were thus included within the accounts of the fieldwork that inspired them. Furthermore, insights gained in the field tended to lead to the research agenda being refined and reformulated. As far as possible, within the constraints imposed by overlapping fieldwork and a linear document structure, such directional changes were positioned to emphasise their antecedents and outcomes. This adaptation in the research agenda in response to emerging insights is a defining feature of this study. Within the document this emergent trajectory has been highlighted through periodic episodes of reflection. It is in the final such episode, where the previous chapter gave due consideration to implications for environmental management arising from the fieldwork as a whole, that a substantial literature survey makes an unusually late appearance. However, the timing of this survey reflects its role in positioning theory that has emerged from the fieldwork. Therefore, when taken together with the inspirational literature survey in Chapter 2, the structure of the document shows how theory and fieldwork can each be in ascendance as the major impetus in the fieldwork-theory relationship.

When trying to characterise this textual structure, there are similarities between it and the textual strategy that Hammersley and Atkinson (1983) call "natural history":

> "One possible way of ordering the text might be to parallel the unfolding of the text to the process of discovery and exploration that characterised the 'natural history' of the fieldwork itself. ... [Such a strategy] might furnish a telling method to elucidate how a particular theme or problem was identified and progressively focused upon in the course of the fieldwork. ... It is, perhaps, particularly apt to adopt such a strategy of presentation if the researcher's problem in discovery or focusing can be shown to parallel the members' problems in finding their own way." (pp. 215-216)

Their latter point is resonant with the twin storylines used to support the 'sense of audience' thesis; however, in responding to their criticism of this style, the textual strategy employed here can be seen to have departed from a strict "natural history":

> "Not only do topics and problems emerge in different ways and at different rates, but also one's theoretical understanding and conceptual sophistication change. Ideas are retrospectively formulated and redefined in the light of such changes." (ibid, p. 215)

Within this document key substantive concepts have been described in the chapters that present the fieldwork which provided their strongest inspiration, however the formulation and articulation of those concepts has inevitably benefited from hindsight. The structure adopted is therefore not a strict 'natural history', but it is nonetheless an attempt to reflect the adaptive nature of the work.

10.3.2 CHALLENGING THE LINEAR MODEL OF RESEARCH

Whilst the preceding chapters have shown the framework and the dynamic, constituitive process model of research to be well-suited to the study of complex emergent issues, the approach is not above criticism. First, it can be regarded as a high risk strategy as its success depends on a researcher's ability to read, to reflect upon, and to articulate a

continually emerging situation in which s/he is an active participant. Second, a researcher must be able to maintain a disciplined scientific imagination and an acute sense of audience throughout the process of developing and sharing a contribution to knowledge. However, this is not such a radical model of research (Hammersley and Atkinson, 1983; Schatzman and Strauss, 1973; Schön, 1983).

> "In addition to the problem of reflecting systematically on a process in which we are engaged (a problem we may learn to solve through practice), there is also the danger of influencing the phenomena we are observing. This danger is particularly intense when the researcher initiates a learning process, but is also attendant on studies of the past or participant observation of the present. Actually it may be less a 'danger' than a fact of life. In the organisational context, the quest for objectivity, in the sense of freedom from influence by the research process, is probably hopeless. A more appropriate kind of objectivity has to do with the researcher's awareness of his or her effect on others." (Schön, 1983, p. 127)

It only appears radical or dangerous when judged against a linear model. Indeed, as this section will make clear, evaluating progress in this kind of research against a linear model could result in cognitive dissonance for the researcher and unease for the assessor.

Complex, transboundary issues, by definition, pose continually-emerging, "wicked" problems that go beyond the wit of individuals, regardless of whether they choose to see themselves as researchers or practitioners (Mitroff and Linstone, 1993).

From the stand-point of a dynamic socially-constructed world, the inevitable prospect of diverse, partial and imperfect appreciations of continually-changing phenomena, suggests that any grounded study of complex issues must adapt if it is to remain faithful to the phenomena being studied.

Support for such an adaptive, process model of research can readily be found, for instance, in Giddens' (1984) position on the inevitability of unintended and unanticipated

consequences of purposeful action; in Law's (1994) views on the nature of ethnography; or in Strauss and Corbin's (1990) arguments for grounded theory.

However, the emergent, adaptive model of research can be contrasted with the planned linear model offered as an 'ideal type' in the materials used to introduce research concepts to new students. For instance, analysis of teaching materials supplied in the 1994 INTA/IERC Research Training Programme, reveals an orientation towards espoused linear models of research; in particular, most were variants on the archetypal model of research presented below (Figure 10-2):

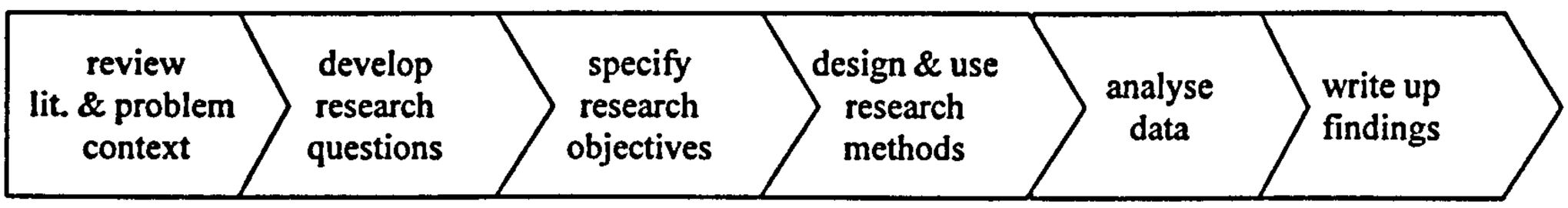

Figure 10-2 Espoused research archetype - a linear model

Furthermore, in formal meetings held to monitor the progress of this work, the notion that a clear focus for the research would emerge from the field, rather than be extant prior to entry, has been a continual source of unease for my assessors (Research Panel Meetings minutes 23/10/95 and 24/10/96). However, this document is testimony to the possibility for action that does more than just reproduce the structures which gave rise to it (Walsham, 1993). Rather than follow the linear model embodied in simplifcations of the research process drawn for the purpose of introducing research concepts, this study seeks to enrich those structures by demonstrating a viable alternative. The following section thus sets out an argument for considering the framework developed in Chapter 3 as a characterisation of the research process better suited to studies of complex issues. More specifically, this framework is offered in preference to the traditional end-state, linear orientation, typified by answering static research questions.

10.3.2.1 ALTERNATIVE MODEL FOR FRAMING STUDIES OF COMPLEX ISSUES

The framework reproduced below is distinguished from the linear model by the mutually-informing linkages between its constituent elements. The implication of these linkages is

that progress must be considered for each element, rather than in terms of a staged movement between elements. In other words, progress must be considered on all fronts, rather than in a single direction towards a pre-determined end-state.

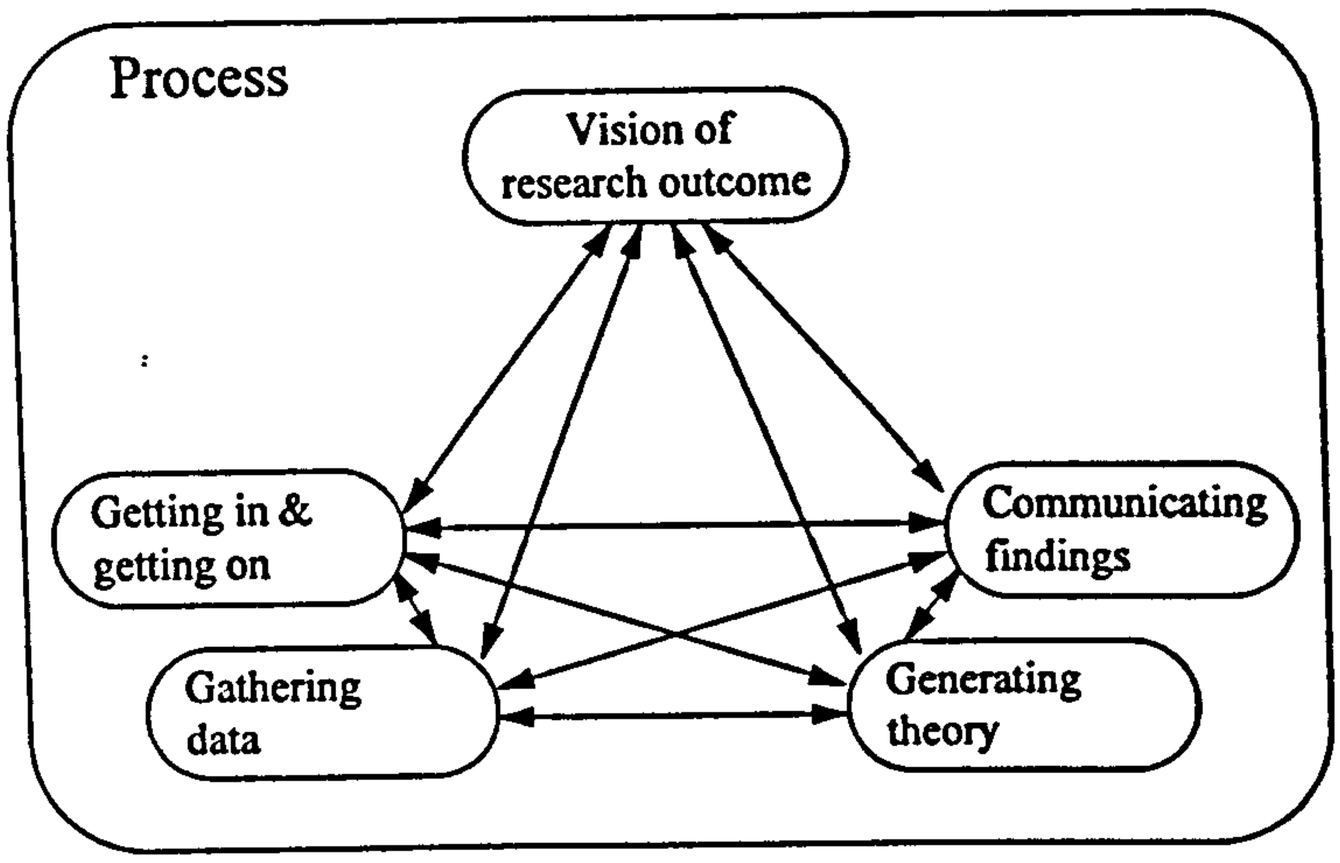

Figure 10-3 An alternative to the linear model of the research process

Whereas emphasis in the linear model rests on clarifying an end-state and ensuring progress towards it, impetus for the adaptive model derives from the mutually-informing relationships between its constituent elements. Therefore, in the latter, it is useful to consider developments in each constituent element and in the two-way linkages between them. Not only must progress on gathering data be considered but reflection upon each of its linkages is also important; for instance, questions must be asked of how the process of getting-in and getting-on has informed data-gathering, and vice-versa. If the framework is used consistently and reviewed periodically then an emergent trajectory in the research agenda should appear in relief (as in **Table 8-1, p. 247**). In this way emergent progress is made explicit so that it might be reflected upon and debated with pertinent others, such as supervisors and assessors.

The key attraction of the adaptive model is that it does not generate the cognitive dissonance that surrounds an end-state oriented approach to studying phenomena that are recognised as being dynamically complex. It inevitably lacks the prescriptive force of the linear model, but this is sacrificed for the flexibility that allows a study to remain faithful to emerging phenomena. The adaptive capacity for dealing with this emerging research

agenda lies largely with the researcher. This study has shown adaptive capacity to be closely linked with a sense of audience, imagination and theoretical sensitivity. In other words, dealing with the complexities of research in this tradition necessitates an ability to "think of the other": how actions are being felt by others, how else things might be, and how theory and data inform one another. The philosophical implications of this are considered in the following section, however it is noted here to highlight salient attributes for adaptive researchers. Within the study, these attributes fostered a capacity for exploiting serendipity; in Strauss and Corbin's (1990) words: "chance favours only the prepared mind." (p. 46). In many ways, these attributes may be as important to the success of research in the adaptive tradition, as a clear end-state is to the linear model.

In considering the viability of the proposed model, it is important to consider its strengths and weaknesses from the perspective of a research assessor. Here, notions of espoused theories and theories-in-use are particularly enlightening (Argyris and Schön, 1978; Argyris, 1993). Whilst assessors may espouse the importance of considering progress against the linear model to students, their 'backstage' theories-in-use may be more sympathetic to the adaptive nature of research into complex issues. For instance, collaborative publications involving research students and assessors at INTA/IERC in the past have criticised linear models for failing to cpature the interactive nature of knowledge assimilation processes in other contexts (eg. Trott et al., 1995). Indeed, assessors' own appreciation of the complexities of managing a continually emerging, highly interconnected research agenda may be the very thing that predisposes them towards outwardly simplifying the research process to make it appear easier to follow in the early stages. By espousing a linear model, key areas of research activity are at least highlighted and the importance of progress is emphasised. If the simplification proves successful in helping students to gain research degrees then it is likely to be reproduced, eventually becoming deeply embedded in practice. Under such circumstances, the nature of the model or the simplification could become taken for granted:

> "Over time the [metaphor] disappears from view, leaving the residual concepts as seemingly literal, objective features" (Morgan, 1996, p. 230)

In parallel to the problems faced by those seeking to deal with environmental issues, organisational defence routines are likely to be activated if such a status quo were to be questioned (Argyris, 1993). To include a section critiquing the context in which this work will be assessed might seem foolish or inappropriate, but to avoid making the point would reduce the force of this thesis considerably. In the story of dealing with complex issues in environmental management, my actions and insights were founded upon the belief that organisational defence routines needed to be challenged in order to promote learning about complex issues. To avoid challenging them here would suggest a difference between actors and researchers and, more specifically, a difference between the knowledge I offered to others and the knowledge I applied for myself. Such inconsistencies in word and deed would necessarily weaken my claims to have offered actionable knowledge (Argyris, 1993).

10.4 ON PHILOSOPHY

Reflecting upon the study as a whole, a set of guiding principles that influenced the work can be clearly discerned:

- a 'sense of audience';
- a mutually-informing relationship between theory and data; and
- an emphasis upon creativity and novel critiques of apparent realities.

These three principles can be seen as constituents of a philosophy of "thinking of the other". A sense of audience involves awareness of how actions are felt by diverse others. Theory and data each inform one another; and creativity involves imagining how things might be otherwise. In this way, the philosophy of "think of the other" set out above is resonant with Emmanuel Levinas' emphasis upon responsibility towards "the Other" and particularly his orientation towards recognising diversity when attempting to share insights beyond the setting in which they were gained:

> "Levinas ... uses transcendence in the sense of rupture, and opening up to the Other, as opposed to Western tradition's reduction of the Other to the Same in its drive to objectify and universalise." (Lechte, 1994, p. 117)

The notions of reflexivity and reversibility that underpin the sense of audience principle are also captured in Cooper's standpoint:

> "We know ourselves only through the echo of the Other" (1983, p. 202)

This heightened state of awareness to opportunities for learning that "thinking of the other" inspires, is the essence of a 'sense of audience'. Like Schatzman and Strauss (1973), I gained new insights when I contemplated engaging diverse audiences. By following the sense of audience principle, the study sought to embrace the double hermeneutic of research (Giddens, 1984), and, in so doing, found resonance with Morgan's (1983) image of research as an illuminating "conversation" with others.

The idea of interpreting the world through a dialectical structure of "in-one-anotherness" captures not only the sense of audience emphasis, but also the grounded theory-data relationship that shaped this work. Indeed, the context-process-content conceptualisation of a constituitive process theory developed herein, resonates closely with Morgan's (1983) critique of Cooper's position:

> "Organisation emerges as a process characterised by otherness ... The structure thus produced is always but an expression of otherness, and thus always part of a wider structure of relations." (p.31)

However, "other" thinking has made a contribution to this work that goes beyond those envisaged by Cooper (1983). That contribution concerns its role in encouraging novel critiques of apparent realities. In other words, contemplating how things might be other than they appear. This philosophy promotes reconceptualisation of apparently linear causal relations, as one is prompted to ask: 'what if the effect were actually a cause ?' This point can be illustrated by an incident I encountered whilst writing this text:

> *The cylinder head gasket on a neighbour's car had blown while the vehicle was travelling on a motorway. On inspection of the engine, the incident had apparently*

resulted in many effects: the cylinder head had warped, most of the coolant had been lost, and the engine had seized. Whilst these would all be anticipated effects of a catastrophic head gasket failure at speed, the neighbour kept an open mind that the loss of coolant might be a contributory cause, rather than an effect. This "other" thinking subsequently paid off when his attention to the coolant system avoided an expensive repeat of the incident with the newly-rebuilt engine.

Within the study, the application of "other" thinking went beyond keeping an open mind on assumed causalities. Techniques based on metaphor were developed to facilitate reconceptualisation of one domain of reality in the light of another. When phrased in this way, the cognitive impetus of this manifestation of "other" thinking can be paralleled with that behind Hegel's dialectic (Morgan, 1983; Pascale, 1990). However, in acknowledging Levinas' conceptualisation of the Other as a call to embrace diversity, this philosophy is not just about setting up creative tension with <u>one</u> other.

"Think of the other" is a broader call for reflexivity and imagination in a turbulent, pluralist world where diversity and complexity are necessarily simplified but the act of simplification is often effaced.

Morgan suggests that this point is well-made in Mangham and Overington's (1983) call for a theatre metaphor for organisational research:

> "... like visitors to a theatre, we can become compliant, uncritical participants and audiences in the drama of everyday life. This is characterised as a state of 'mystification', in which we become preoccupied or hypnotised by a particular element of the pentad [involving act, scene, agent, agency and purpose] so that we are blind to what is happening and to alternative courses of action." (Morgan, 1983, pp. 31-32)

This call to consider how a situation could be viewed as many things other than that which it is taken-for-granted to be, is at the heart of the "other" thinking that has shaped this work. It has influenced the course of both stories of dealing with complexity that appear in this text: the story of actors' dealings with complex, transboundary

environmental issues and the story of how those dealings were researched. Thus, in terms of this study's approach to dealing with complexity, its three guiding principles - sense of audience, mutually-informing theory-data relations and creative critique - can be seen as manifestations of an appropriate philosophy for the task in hand, a philosophy of "think of the other".

10.5 TOWARDS A CONSTITUITIVE PROCESS THEORY OF RESEARCHING COMPLEX ISSUES

Having reflected upon the philosophy, methodology and methods of this study, it is now possible to integrate the insights gained and represent them as a grounded constituitive process theory for researching complex issues. This is shown below (in Figure 10-4):

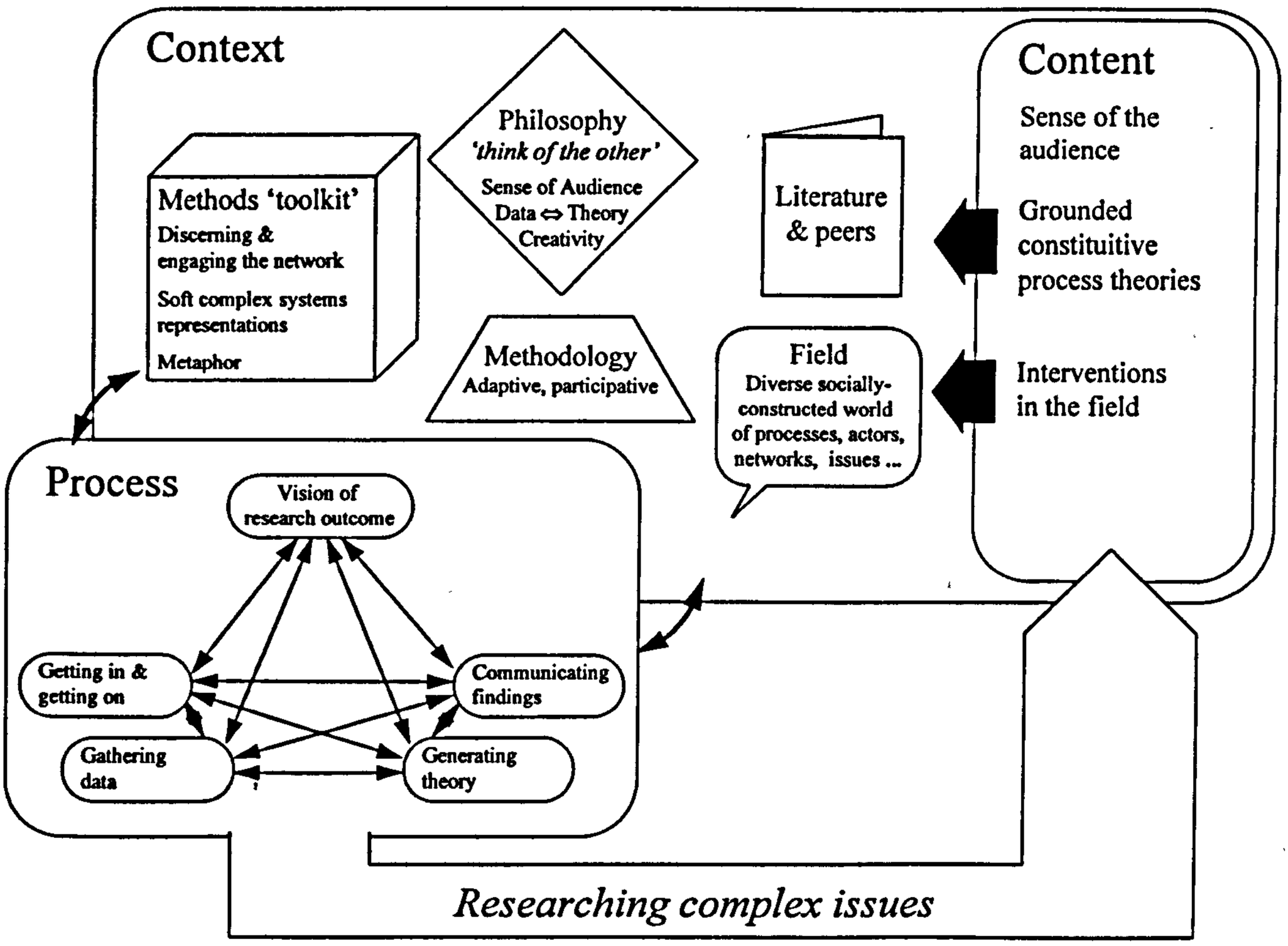

Figure 10-4 Grounded constituitive process theory for researching complex issues

This diagrammatic representation highlights aspects of context that gave meaning to this study's research process. By means of the two large dark arrows, the diagram also draws attention to the outcomes from the research process that lead to its self-organising nature. In particular, ongoing conversation with peers, through conferences and publications, and ongoing interactions with actants in the field, provided feedback to the adaptive research process. Furthermore, through the course of the research process an awareness of the specific audience for the work was gained; this is also shown. The diagram is thus offered as a succinct account of the methodological implications of this work which highlights salient features of the context, content and process of researching complex issues in an organisational context.

10.6 REFLECTION UPON A 'SENSE OF AUDIENCE'

In recognition of the audience for this work, this text has been extremely careful in its introduction of new terminology. Where new terminology has been used, for instance, 'creative dialogue' and 'soft complex systems', the terms have been chosen to reflect an integration of established concepts, rather than adding to Nohria's metaphorical jungle:

> "Anyone reading through what purports to be network literature will readily perceive the analogy between it and a 'terminological jungle in which any newcomer may plant a tree." (Nohria, 1992, p.3)

In attempting to formulate a contribution that is shaped by a sense of audience, this study has transcended disciplinary boundaries. Sociology has provided grounded theory (Strauss and Corbin, 1990), and notions of getting in and getting on (Hammersley and Atkinson, 1983; Lofland 1971). Natural resource management has contributed adaptive management (McLain and Lee, 1996; Walters, 1986). Philosophy has contributed "think of the other" (Lechte, 1994) and, together with linguistics (Kittay, 1987), has given depth to organisational researchers' use of metaphor (Gordon, 1961; Morgan, 1986 and 1993; Rickards, 1990). Information Systems theorists have drawn upon sociology (Giddens, 1984) to introduce constituitive process theories (Walsham, 1993). Organisational theorists have drawn upon psychology to provide notions of individual and group learning

(Argyris, 1993; Argyris and Schön, 1978; Senge, 1990), and systems thinking to provide approaches to problem-investigation (Checkland, 1981; Senge, 1990). Philosophy of science has contributed notions of paradigm (Kuhn, 1970) and actor-networks (Callon and Law, 1989; Law, 1992). These ideas, and more, have been ordered through the research process into two frameworks for dealing with complex issues: one formulated with an environmental management audience in mind (**Figure 9-2**, p. 270), and one with a general organisational research audience in mind (Figure 10-4, p. 317). While the transdisciplinary grounding of these frameworks is largely effaced, the process of their construction and their content is offered in support of the 'sense of audience' proposition that opened this document.

In Law's (1994) terminology, the two frameworks developed in this document are precarious orderings which may seem more or less stable to those who encounter them. This might suggest that the 'sense of audience' proposition would be overturned immediately if the intended audiences do not find resonance with their own experience in the frameworks. However, it is more likely that it is my sense of the audiences that should be overturned, my particular instantiation of the thesis, rather than the thesis itself. That is not to say that a 'sense of audience' is immutable. Instead, it suggests that the thesis rests on the entirety of this work and not just on two diagrams, however succinctly all-embracing they attempt to be.

Although the notion of a "sense of audience" received some attention in Schatzman and Strauss's (1973) text, it is not a well-used term in social and organisational research. This is somewhat surprising as experiences in the field indicated that it had a high degree of resonance for organisational actors (Chapters 4 through 7). Writers are perhaps more likely to be familiar with the term than organisational researchers (see, for instance, Dixonkrauss, 1995, or Gregg et al., 1996), but, as the previous sections have shown, it embodies many recent calls for useful organisational research (eg. Kanter and Eccles, 1992) and it is clearly consistent with Morgan's (1983) model of research as conversation. The reintroduction of the term into the general context of organisational and environmental management research is therefore seen as a major methodological implication of this work.

10.7 SUMMARY

This chapter has reflected upon how this study has responded to the methodological challenges raised by the literature survey in Chapter 2. More specifically, it has demonstrated the strengths of constituitive process theories as representations of the interrelations between context, process and content which characterise actors' dealings with complex issues, particularly within the environmental management arena. Furthermore, it has set out an argument for the appropriateness of adaptive research methodologies for dealing with the challenges of researching such complex issues in an organisational context. The chapter has shown how an adaptive approach to research can draw upon a 'toolkit' of methods which include: discerning and engaging a network of pertinent actants, formulating soft complex systems representations and using metaphor to foster reflexivity and creative critique of apparent realities.

In reflecting upon these ideas, the chapter has demonstrated how the special nature of the guiding philosophy of this work is captured in the phrase 'think of the other'. It has illustrated, in particular, how this call acts as a leitmotiv for the 'sense of audience' thesis, the grounded relationship between theory and data, and the creative critique techniques that have shaped this study. A synthesis of these methodological insights has been provided in the form of a grounded constituitive process theory of researching complex issues (Figure 10-4, p. 317).

Finally, the chapter has emphasised the methodological implications of reintroducing a "sense of audience" to those interested in dealing with complex issues in organisations. The following, and final, chapter considers the broader implications of this study in more detail and highlights specific areas deserving of further study.

11. IMPLICATIONS FOR OTHER CONTEXTS & SUGGESTIONS FOR FURTHER WORK

This final chapter looks at the implications of the findings of the study for areas other than those considered previously. In particular, it reviews implications for those interested in the concept of the learning organisation and in large-scale environmental work. It then sets out an agenda for extending the study's constituitive process theory of the formation of adaptive response networks to encompass ways in which such responses can be sustained. That agenda considers the role of IT in providing a durable infrastructure for collaborative endeavour and explores conflicts that could arise for stakeholder representatives when they try to sustain membership of an adaptive response network. Finally, the chapter concludes by looking beyond the document to alternative means by which its messages might be communicated.

11.1 ON IMPLICATIONS FOR OTHER CONTEXTS

Whilst the previous two chapters have reviewed the substantive and methodological implications arising from the twin stories of organisational actors' dealings with complex transboundary environmental issues and my dealings with the complexities of trying to research them, this section explores the study's implications for other contexts. More specifically it highlights implications for conceptualisations of the learning organisation, and uses cross-fertilisation between the two stories to reveal implications for large-scale, participative environmental research.

11.1.1 IMPLICATIONS FOR THE LEARNING ORGANISATION

Although the study has been strongly influenced by writers on the "learning organisation", it follows Pedler et al. (1991) in questioning the appropriateness of the label. Of the two every-day meanings of the word 'organisation', its bounded entity sense is often to the fore, rather than its "process of ordering work" connotation (Pedler et al. 1991). Like Pedler and colleagues, this study has demonstrated how insights can arise from both noun and verb senses of the word 'organisation' (section 9.1.1.3), but it has

also shown 'organisation' to be an inappropriate unit of analysis for capturing the essence of the phenomenon of collaborative learning in environmental management (section 5.2).

Any label that is introduced for a 'new' phenomenon must capture the essence of the phenomenon it denotes, be instantly recognisable to its intended audience and have minimal undesirable connotations. For these reasons, Pedler et al. take issue with the "mechanical", "abstract and lifeless" nature of the word 'organisation', fearing that audiences might find the prospect of dealing with it "intimidating". In its place, they propose the idea of a "learning company", on the grounds that company is "one of our oldest words for a group of people engaged in a joint enterprise" (p.1). Whilst the notion of learning companions is a useful one, the connotations of the word 'company' question its ability to fulfil all the afore-mentioned criteria for an appropriate label. Indeed, Pedler et al., themselves, recognise these limitations: "we use the word 'company' for any collective endeavour and not to identify or give preference to a particular legal form or ownership pattern" (1991, p.1).

This study has therefore taken a different route and used the language of networks to interpret and to shape collaborative endeavour. In this context, the word 'network' has proved appropriate for capturing the essence of the phenomenon; it has suggested an appropriate level of analysis and been instantly recognisable to practitioners. Although proponents of "web" analyses (Kling, 1987 and 1992) would perhaps argue that it too could achieve these things, 'web' tends to invoke an image of an all-powerful centre and lacks the noun/verb polyvalence of 'network' (Kanter and Eccles, 1992) This polyvalence provides a similar, if not more obvious, 'think of the other' cognitive force to 'organisation'. Therefore, for considering learning beyond the individual, 'network' is proposed here over 'organisation', 'company' and 'web'. If Nohria's (1992) terminological jungle is now revisited to plant the term 'network' in the collaborative learning domain, several shoots are immediately apparent: 'Network Learning'; 'Learning to Network and Networking to Learn'; and 'the Learning Network'. Inevitably these labels bring connotations and the most obvious of these - images of electronics and computing - is seen by some as potentially problematic (Nohria and Eccles, 1992b).

However, the images thus invoked at least bring to mind phenomena deserving of consideration (see section 11.2.1).

From a methodological point of view, the term invites consideration of the work of actor-network theorists, such as Michel Callon and John Law (Callon, 1991; Callon and Law, 1989; Law, 1992, 1994), and this study has demonstrated how their work enables rich accounts of both stability and change to be represented as constituitive process theories (section 10.1.3). Insights structured in this way, may well enrich the domain that has become known as the 'learning organisation' and, perhaps, reinforce moves for it to be reformulated as the 'learning network'. The grounded introduction of 'network' into the domain of collaborative learning is thus seen as an important implication from this work that extends those previously described.

The second implication for this domain concerns the study's use of metaphor. Rather than concentrating effort on arguing that 'learning organisation' is a potentially-misleading anthropomorphic metaphor (see, for instance, Døving, 1996), this study has emphasised metaphor as a technique to promote creativity and to foster a reflexive awareness of perceptual diversity. In so doing, it has shown how metaphor, as a technique, can facilitate learning by fostering an appropriate climate in which it can take place - a creative "spirit of inquiry" (Senge, 1990). Other sections have set out the study's associated conceptualisation of 'creative dialogue' (section 8.1.2) and have reflected upon its use of metaphor (section 10.2.3). However, it is useful here to reiterate that its use of metaphor accords with Gareth Morgan's recent emphasis (1993) and Chia's (1996) view:

> "... that the use of metaphor is better appreciated as a triggering point in the process of metaphorisation rather than as an end in itself. From this perspective, established and hitherto unproblematic categories of thought ... are subjected to critical scrutiny and systematically 'loosened' in order to induce cognitive rearrangement ..." (p. 130)

Using metaphor in this way is congruent with the philosophy of "think of the other", set out in section 10.4. Those who apply the technique are encouraged to imagine how things

might be otherwise and to recognise that things might appear differently to others. When this approach is carried across to the domain of the learning organisation, the notion of a network of individuals "working together with imagination" (section 8.1.2) usefully encapsulates the way metaphor facilitates both the context and process of creative, collaborative, reflexive inquiry for which learning organisation theorists call (cf. Kim, 1993; Senge, 1990). In this way, 'metaphor' joins 'network' as a grounded contribution from the study that has particular relevance for the domain of the learning organisation.

11.1.2 IMPLICATIONS FOR LARGE-SCALE, PARTICIPATIVE ENVIRONMENTAL RESEARCH

If the study as a whole is reviewed then similarities between the substantive and methodological stories are readily apparent. Both share an emphasis on building adaptive capacity to respond to emerging issues; both feature notions of networks and networking; and both follow a grounded, participative approach to developing understanding of a focal issue by seeking out imaginative critique from diverse perspectives. This section will demonstrate how these similarities provide a potential basis for large-scale, participative environmental research.

The study's conceptualisation of the formation of an adaptive response network shows how insight, data and expertise can be pooled, by representatives of stakeholders in a particular environmental issue, to provide a more holistic basis for interventions. In the approach, representatives effectively step out of role to work together to create a shared understanding of both the issue, and desirable and feasible pathways for dealing with it. They then step back into role to attempt to make appropriate interventions. In many ways, this conceptualisation can be compared with a coordinated set of action-research projects. The process of identifying suitable projects maps closely to the concept of networking. The process of pooling insights and coordinating effort can be aligned with the concept of 'creative dialogue'. The concepts of brokers and information infrastructure suggest a new role for action-researchers and a new destination for research funding, respectively.

Of all the literature reviewed, Allen and Bosch (1996) come nearest to this model of an adaptive network approach to researching large-scale environmental issues. Their "on-going community dialogue/scoping/learning" model encourages consideration of different hierarchies of decision-making that are pertinent to sustainable land management practice, and highlights opportunities for information technology to make pooled data available in a meaningful way at each level.

The grounded conceptualisation of an adaptive response network developed herein, complements Allen and Bosch's model, and offers a number of additional features. First, it provides a categorisation mechanism, an eight-attribute model of a stakeholder, which network brokers can use to identify representatives who might usefully get involved. (This categorisation mechanism is more sophisticated than the coarse divide between scientists and land managers/users that appears in Allen and Bosch's model.) Second, it offers a rich picture of a reflexive, creative process through which data and information can be shared by individuals from diverse groups. Third, it invites consideration of individuals who might be on the margins of the endeavour; and, finally, it draws attention to tension that can exist between thoughts and deeds on the adaptive response network plane and thoughts and deeds on the stakeholder plane.

Synthesising the outcome of this study with Allen and Bosch's (1996) model of the structure of an adaptive, participatory response to the challenge of sustainable land management, could provide the basis of a framework for conducting large-scale, participatory research on complex environmental issues. Although this study was grounded in the experience of a lone researcher, a synthesis of the two models enables research teams to be incorporated. More specifically, the conceptualisation of a stakeholder provides a suitable mechanism for clustering researchers so that shared representations of a focal issue might be negotiated within appropriate stakeholder groups before being brought to the adaptive network. In this way, stakeholder representatives, involved in developing a shared understanding of the issue, would be presented with significant variety in appreciations of the issue, rather than being swamped by unmanageable variety in scientific opinion.

Such an approach would not give structural privilege to scientific knowledge *a priori*; rather, the scientific community appears as a member of the audience for the focal issue and, as such, is categorised in the same way as other members of that audience. This is significantly different from Allen and Bosch's pre-determined schism between scientists and others, and Renn et al.'s (1997) pre-determined classification of research team, sponsor, citizens, experts and interest groups. However, the question of who would be responsible for resourcing the durable core of the network, the brokers and the information infrastructure, remains to be answered. This is an important consideration as brokers are charged with discerning pertinent perspectives and bringing them together. Their sense of audience, their notions of what constitutes significant variety in perspectives on a particular issue, are likely to have a major influence on the shape of the adaptive response network. In the central study, joint-funding was used to provide a sense of the neutrality necessary for the brokering role to be carried out, but maintaining apparent neutrality in the face of emergent, complex and embedded issues is unlikely to be easy.

In the central study, a UK County Council took the lead in attempting to get European Union funding for such an endeavour. Universities in the UK could also fulfil this role through large-scale Natural Environment Research Council (NERC) projects. Through these, spatial areas would effectively become virtual laboratories in which a diverse network of actors (local communities, businesses, researchers, local authorities, etc.) would be engaged in adaptive environmental management, continually learning by doing. Although indications from the field and the literature (Hooper and Preece, 1997) suggest that it might not welcome such a role, the Environment Agency could also be considered in such a proactive coordinating capacity. In addition to utilising established organisational structures, some form of Quasi Non-Governmental Organisation (quango) could be created specifically for the purpose of providing a durable core. Indeed, a whole range of policy options would need to be creatively critiqued before choosing an appropriate vehicle for providing durability to adaptive response networks which blur the line between environmental research and practice.

In speculating thus far, the grounded conceptualisation of an adaptive response network has been extended some distance beyond the settings that inspired it. It is therefore prudent to conclude this section at this point as it has achieved its aim of highlighting the study's implications for future large-scale, participatory environmental work.

11.2 SUGGESTIONS FOR FURTHER WORK

The study has set out an argument for transboundary collaboration in response to complex environmental issues. Furthermore, it has identified a mechanism by which appropriate ties can form - networking - and suggested that both strong and weak ties (Granovetter, 1973) can play a part in maintaining network responses to issues that transcend organisational boundaries. However, additional research is needed to develop these ideas further. The following sections set out an illustrative agenda for such research. This focuses in particular upon developing a constituitive process theory of how issue-based adaptive response networks can be sustained over time and across space. Picking up on themes raised earlier, specific attention is devoted to the role IT might play in this context and to organisational actors dealings with the conflicts which transboundary interaction could bring.

11.2.1 ON THE ROLE OF IT IN ADAPTIVE RESPONSE NETWORKS

In considering an agenda for further work in more detail, it is clear that strong parallels can be drawn between adaptive response networks and the notion of network or virtual organisations (although the former's emphasis on issue-based collaborative drive provides a useful distinguishing feature). This section notes growing interest in the role of IT within this parallel domain and uses this to formulate an agenda for advancing understanding of ways in which adaptive response networks can be developed and sustained.

Whilst caution is being expressed about 'network' in an organisation sense becoming synonymous with 'network' in an electronic/computing sense (see, for instance, Nohria and Eccles, 1992b), it is clear that increasing attention is being devoted to opportunities

which IT creates for questioning the appropriateness of traditional (spatially-founded) methods for organising collaborative endeavour (Hammer and Mangurian, 1987; Venkatraman, 1994). Indeed, a growing number of authors are linking the emergence of new organisational forms (often referred to as "network" or "virtual organisations") to the advent of technologies, such as electronic mail and groupware, that facilitate collaborative endeavour across organisational boundaries (see, for instance, Mowshowitz, 1994; and Upton and McAfee, 1996). Technology-driven visions of new modes of organising, or "technological imperatives" (Markus and Robey, 1988), tend to be in vogue, but there are some calls for an emergent, constituitive process view of the role of IT in transboundary networked endeavours (Kumar and vanDissel, 1996; Orlikowski and Hofman, 1997; Walsham, 1994). As the following paragraphs will explain, it is this latter perspective that accords with the agenda for further work being set out here.

This study has developed a conceptualisation of adaptive response networks forming when individuals who share an interest in a particular issue try to improve the effectiveness of their interventions by pooling insight and understanding. In the context of environmental issues, the study has provided grounded support for the truism that those issues have no respect for organisational boundaries (Hadfield and Cannibal, 1996). Therefore, adaptive response networks for dealing with environmental issues tend to necessitate collaboration that transcends the boundaries of responsibility and concern that individual actors assume as a consequence of their organisational roles. Against the backdrop of an increasing penetration of IT capable of supporting such transboundary collaboration, it would be inappropriate for a future study to neglect its role in this arena. However, this does not mean to say that such a study would portray technology as the impetus for the process of forming and sustaining adaptive response networks. Rather, it would need to consider mutual interplay between the possibilities of IT, and organisational actors' desires, understanding and capacities for responding to issues that they regard as complex and transboundary.

By conceptualising the role of IT in this way, the study would be aligning itself with researchers, such as Walsham and Han (1991) and Orlikowski and Robey (1991), who assume a reflexively-monitored, mutually-producing relationship between action and

social structure that is mediated, to a greater or lesser extent, through technological artefacts. Under this perspective, IT would appear as part of an infrastructure for enabling (and constraining) interorganisational learning on complex, transboundary issues. In other words, IT would constitute a medium through which network learning was enacted.

Such a conceptualisation would raise a number of research questions. For instance: how would an information infrastructure which transcended organisational boundaries be structured and resourced ? How would the process of forming and sustaining adaptive response networks be influenced by differing emphases on face-to-face and electronically-mediated interaction ? In an area that is relatively new, directly relevant contributions from the literature are scarce. However, related work suggests directions that an appropriate study might take. For instance, with regard to the former question, Kumar and vanDissel (1996) observe:

> "As the participants in the interorganisational alliance interact by actively using IT-based support, they discover elements of deep structure in the interaction situation and incorporate this structure in their evolving use of the technology. Moreover, IT itself becomes one of the structuring partners in the reciprocal relationship. Thus, while IS/IT influences the group structure and dynamics, the group processes themselves influence the appropriation and structure of IT that is used ..." (p. 288)

Following on, but with greater relevance to the latter question, Davenport and colleagues' analysis of knowledge work processes concludes that:

> "... the most promising technologies for knowledge management are tools such as Lotus Notes [groupware] or the World Wide Web, which our research sites were just beginning to develop. ... [T]he application or reuse of knowledge can sometimes be enhanced by applying technology. However, when the improvement goal is better creation of knowledge, design strategies involving where and with whom people work are more likely to be effective." (Davenport et al., 1996, p. 64)

Similarly, Nohria and Eccles (1992b) argue that creative network organisations cannot be built solely on electronic networks:

> "At the core, the network organisation depends on a network of relationships forged on the basis of face-to-face interaction. This network of relationships serves as the substrate on which the electronic network can float ..." (p. 304)

In drawing attention to a conceptual "substrate" which is shared sufficiently by individuals engaged in electronically-mediated interaction for them to regard those interactions as meaningful, Nohria and Eccles (1992b) touch upon the very heart of an adaptive response network: the plane in **Figure 9-1** (p. 267) that unites representatives from different stakeholder cliques. Earlier chapters have developed a conceptualisation of this plane as dynamic in nature, continually being made and remade through the interactions of parties dealing with a particular issue. Although characteristically dynamic, areas of stability and durability within the plane have also been highlighted. These have been described in terms of the durable core of an adaptive response network, appearing, most obviously, in the context of a shared vision of 'managing to learn and learning to manage' and a notion of infrastructure. Technological artefacts, specifically computer systems and electronic communication networks, have been highlighted as key aspects of this durable infrastructure (section 9.1.1.2). Indeed, following the actor-network perspective on which the conceptualisation of the adaptive response plane was founded, technological artefacts and Nohria and Eccles' "substrate" appear as more or less stable features of the networks of the social that characterise pertinent actors' day-to-day realities. From such a standpoint, the dualism between conceptual substrate and mediating technology collapses, leaving in its place a duality. A research agenda influenced in this way would need to consider how electronically-mediated interactions produce a shared conceptual substrate for building holistic responses to transboundary, complex issues, as well as the more conventional interest in how shared understanding influences electronically-mediated interaction. In Kumar and vanDissel's words from earlier, it would need to look at how interorganisational technology leads to elements of "deep structure" being discovered and then incorporated into the technology itself. When presented in this way, the two-way relationship between information technology and

transboundary learning becomes apparent, and the appropriateness of a constituitive process theory is reinforced.

An agenda item for further research which follows from this, would concern the types and modes of interaction (technology-mediated and face-to-face) that are involved in the process of continually making and remaking adaptive response networks. A number of typologies could be used for such an investigation: for instance, Granovetter's (1973) strong and weak ties; Abra's (1994) classification of collaboration as fixed or open-ended, intimate or remote, horizontal or hierarchical, and homogenous or heterogenous; or whether the interaction involves single or double loop learning for one, both or neither of the parties (Argyris and Schön, 1978). Each of these classifications could be applied to characterise participants' interactions with "punctualised" others (Law, 1992), particularly their stakeholder cliques and the adaptive response network. In this way, conflicts for individuals could be highlighted (see the following section) and reflection could be structured regarding the contribution different modes of interaction might make to adaptive response networks at different stages. For instance, do significant differences exist between the types and blends of face-to-face and technology-mediated interactions that characterise the formation of an adaptive response network, when compared to those involved in sustaining one ?

Whilst it might seem obvious to associate technology-mediated interaction with remote, weak ties that do not facilitate mutual learning, such preconceptions are called into question by some recent accounts of IT usage. Senge (1990) and Kim (1993), for instance, describe how computerised "microworlds" enabled individuals and teams to explore their intuition about complex phenomena through intense model building activities. Moreover, Orlikowski and Hofman's (1997) account of how unanticipated collaborative behaviour emerged when a new groupware computer system made problems facing a team of operatives visible to all, suggests that it would be unwise to relegate technology-mediated interaction to a 'back-seat' role in the study of adaptive response networks.

In short, an agenda for extending ideas from this study could usefully consider:

- opportunities offered by Information Technologies that enable new insights to be gained (eg. microworlds) and existing insights to be shared across organisational boundaries and issue boundaries (eg. e-mail, groupware, intranets and shared databases);
- a two-way relationship between IT and transboundary network learning; and
- differences in the types and modes of interaction that characterise adaptive response networks at different stages.

11.2.2 ON MEMBERSHIP OF MULTIPLE NETWORKS

A second theme to emerge from reflection upon limitations of the concepts developed within the study, concerns individuals' abilities to sustain strong ties with potentially-diverse social networks, such as their stakeholder group and an adaptive response network. Positions on this theme vary within the literature. Granovetter's (1973) notion of a "forbidden triad" suggests that it would be unlikely for individuals to be able to sustain the "psychological stress" of strong ties to diverse groups. If Senge's (1990) more optimistic assessment prevails, then the situation may be seen as one of "creative tension" between a vision of how things might be, glimpsed through participation in the adaptive response network, and the reality of things as they currently are in the stakeholder clique. In either case, an important research question for further work would concern the way in which individuals manage conflicts arising from membership of potentially-diverse social networks (adaptive response networks and stakeholder cliques).

From both viewpoints it appears that ontological security is under threat when an individual tries to reconcile membership of groups with conflicting worldviews, norms and priorities. Indeed, anxiety or cognitive dissonance seems an inevitable consequence of interaction with others that questions taken-for-granted emotional and cognitive anchors, lodged in day-to-day routine (Lash and Urry, 1994). Whilst both perspectives concur with Giddens (1984 and 1991) that reflexive maintenance of ontological security is endemic to the human condition, they depart on their assessment of individuals' capacities to achieve change that will relieve cognitive dissonance. Granovetter can be considered pessimistic in his assumption that knowledgeable individuals will avoid such

situations on the grounds that they are too stressful. Senge (1990) and Pascale (1990) appear more optimistic about the extent to which individuals can work with their cognitive dissonance to achieve change.

The formulation of adaptive response networks developed in the study is oriented towards the latter more optimistic view, although it recognises the dangers to which the former refers. It draws attention to problems of sustaining membership in networks on different planes - stakeholder cliques and adaptive response networks - but the resultant notion of a tension between identification with local goals (often oriented towards early satisfaction of the needs of the stakeholder group) and calls for a broader, more sustainable perspective, is not unusual (Welford, 1996). What is unusual is that the unit of analysis has shifted; the boundary of an organisation has been stripped away to leave exposed the struggles of individuals attempting to reconcile dual membership, trying to "think global and act local".

Senge (1990) uses the metaphor of an elastic band to represent the tension between a shared vision of a better way and present reality. Following this imagery, the elastic band is the driving force of an adaptive response network: appropriate individuals need to be inspired to stretch the elastic band between their stakeholder groups and the adaptive response network plane. If the difference between the two is too great, then the tension may prove impossible to establish or sustain. If there is insufficient differential between the stakeholder groups and the adaptive response network, then the tension is unlikely to lead to any radical improvement of present reality. The essence of an adaptive response network is that the plane is being continually made and re-made through the interactions of those involved in it. Together, the participants are continually readjusting the tension on the elastic bands that constitute the network, and each is affecting the others. Therefore, in order to extend the ideas from this study, the process needs to be studied over time at both an individual and a network level.

At an individual level, an agenda would need to encompass issues of ontological security and anxiety that influence on-going decisions to engage in, or to avoid, adaptive response networks. At a network level, the process of negotiating a shared vision of the issue at

hand and how it should be dealt with, would need to be studied in parallel, as this sets up the creative tension that individuals must reconcile. A longitudinal study would enable shifts in the locus of the adaptive response network to be charted as the intensity and variety of interactions that constitute it, change with individuals' perceptions of the focal issue. Indeed, evidence from the central study suggests that networks established in response to old issues (in this case: radiation monitoring) may provide latent linkages that can be tapped when the locus shifts to responding to a new one (ie air quality management). Further research in this longitudinal, multi-level style would be consistent with the development of a constituitive process theory (Walsham, 1993) of adaptive response networks. Moreover, it would help to redress the balance between structural and process views of networks, highlighted below:

> "Learning about how managers themselves come to understand the nature of the networks they are involved in and how they then seek to alter and use them for their own purposes will add a more active, process view of networks to the structural view that predominates." (Kanter and Eccles, 1992, p. 527)

11.2.3 SUMMARY OF AN AGENDA FOR FURTHER WORK

The previous two sections have set out an agenda which would enable the ideas developed within this study to be extended. In particular, the agenda would enable the ideas to be extended beyond the formation of adaptive response networks, to the process of sustaining them. That agenda invites longitudinal consideration of the mutually-constituitive relationship between the social and technical manifestations of network interactions and the cognitive structures of the individuals who engage in those interactions. The agenda has been inspired by actors' dealings with the complex and transboundary nature of environmental issues. Whilst the study has resonance for other transboundary endeavours that exhibit issue-based collaborative drive (for instance, tackling public health issues), the environmental context remains a fruitful one in which to pursue the emergent agenda. Indeed, if the present trajectory of concern for the quality of local environments is to continue, it may become imperative that the agenda is so addressed, in order that effective collaborative endeavour can be sustained that responds

creatively to the increasing profile and the dynamic, transboundary and embedded nature of environmental issues.

11.3 BEYOND THIS DOCUMENT

This document has attempted to fulfil the requirements of rigour and originality that befit a Doctoral thesis, whilst seeking to maintain a sense of audience for those who study and practice the management of complex issues in organisations. At times, the former has outweighed the latter and limitations inherent in paper-based representations of dynamic phenomena have also been a constant challenge (see, for instance, section 9.1.1.5). However, as Hammersley and Atkinson (1983) note:

> "We can never tailor our ethnographies to match the interests of all our potential audiences simultaneously. No single text can accomplish all things for all readers." (p. 228)

A sense of audience leads to recognition of such limitations and, therefore, provides impetus for communication beyond the focal text. Whilst somewhat cynical, David Avison's comments on part-time PhDs, nonetheless, provide a healthy reminder that the thesis document is not an end in itself:

> "... you can get papers going at conferences, ... get feedback. ... Such a strategy is much better, more useful, quicker to get results, and more people will read your work (a maximum of two will read your thesis)." (UK Academy of IS Newsletter)

However, in accordance with the process philosophy of this work, such wider communication has already taken place, and will continue to take place, for it is only by engaging pertinent audiences that a useful contribution to knowledge can be constructed (Giddens, 1984). Options for engaging audiences vary in the richness of interaction they support and the reach that they afford. To date, papers in environmental management publications with varying blends of rigour and relevance have been used (eg. Stubbs, 1996a), as has a chapter in an environmental management text (Stubbs, 1996b) and

several conference presentations (eg. Stubbs and Lemon, 1996; Stubbs and Lemon, 1997). Related undergraduate and postgraduate programmes have also been designed and are now on-going in my home university. In addition to developing this range of interaction forms, two additional options deserve consideration for the future: action-research in the consultancy vein and a World Wide Web presence for the thesis. Whilst the former may be considered an extension of the modes already used within the study, the latter marks a new direction.

The Internet and its more user-friendly face, the World Wide Web, combine to offer an increasingly-used communication platform, characterised by global reach (Quelch and Klein, 1996). This feature is particularly attractive for disseminating information to environmental researchers and practitioners (Heywood et al., 1997), particularly when it is coupled with a capacity to learn about the audience who 'visit' an Internet site (Stubbs, 1996b). Although Abra draws on Sartre to argue that paper-based texts constitute a collaborative creative endeavour between reader and writer, writers often get little feedback from this 'partnership':

> "Sartre ... saw reading as a creative activity and the writer-reader dyad as a partnership between equals ..." (Abra, 1994, p. 3)

With an Internet site, the option of counting the number of 'hits' that particular pages receive, provides an indication of the level of interest in the material therein. Also, if the pages use the hypertext features of the medium to support levels of abstraction, it is possible to see how deep 'visitors' are delving into the ideas, by comparing 'hits' on pages at different levels. Furthermore, electronic conferencing facilities could be integrated into the site to facilitate on-going conversation about the themes it contains. This capacity for enhanced interaction with global reach suggests that the World Wide Web deserves to be explored as a means for sharing the findings of the study with audiences for whom the work is intended to have relevance.

In concluding this text by considering its place within a broader context of communication strategies, the 'think of the other' philosophy can clearly be seen. In

short, the self-critique herein has been guided by a sense of audience which has inspired consideration of alternatives. Furthermore, a concluding section that looks beyond the document, strengthens the adaptive process model of research which its content and structure have presented. This document does not mark the end of the research process. Rather, it represents a sustained piece of academic writing on the journey thus far, that is being exposed to others for their consideration and critique.

11.4 SUMMARY

This chapter has explored the implications of the study in two additional contexts: organisational learning and large-scale environmental work (eg. the adaptive management of a river basin). In each of these, suggestions have been made regarding areas that the study has revealed as particularly deserving of attention. In the former, notions of network and metaphor have been highlighted; whereas, in the latter, attention has been drawn to opportunities and challenges associated with resourcing the coordinating core of a network of action-research projects.

In order to extend the ideas of the study beyond the formation of adaptive response networks, to the process through which they are sustained, a research agenda has been set out which encompasses two emergent themes from earlier fieldwork. The first of these concerns the role of IT and particularly a duality between its use and the shared assumptions of its users. The second concerns the tension that stakeholder representatives are likely to experience in sustaining membership of an adaptive response network if it causes them to question the prevailing norms, beliefs and behaviour of the group they represent.

Finally, the chapter has concluded by reflecting upon the limitations of a paper-based thesis as a vehicle for communicating understanding gained through the study. Although the variety of communication strategies used during the course of the study is noted, the need for continually devoting attention to communication (highlighted in the research framework developed in Chapter 3) is demonstrated by speculating on suitable strategies beyond the document. In this way, the document has shown its commitment to the

adaptive process model of research, the sense of audience principle and its overarching philosophy of 'think of the other'.

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13. APPENDIX

CONTENTS

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13.1 LETTER OF APPROACH TO WASTECO

"Lots of data but little information: learning to collect and organise environmental data with a sense of audience"

BACKGROUND

UK organisations are facing increasing demands for information about the environmental effects of their activities. Whether as a response to external pressures such as legislation, or as a consequence of internal initiatives, organisations are increasingly finding themselves encouraged to collect and present data which illustrates relationships between their business activities and the socio-ecological environment in which those activities take place.

However, providing information about the environmental effects of human activity is generally regarded as problematic and inextricably linked with issues of individual perspective or 'world view'. Differing perceptions of 'relevant facts', conflicting views on the relative significance of phenomena and inherent difficulties in conceptualising the temporal and spatial scales argued to be necessary when assessing environmental effects, make interpreting environmental data far from easy. The variety of collection strategies and sources from which 'relevant' data may be gathered presents organisations constrained by limited resources, with a complex decision situation; one in which a desirable and feasible pathway must be discerned towards a means of providing environmental information which is sensitive to the concerns and understanding of those parties who need to use it. Identifying attributes of such a pathway is the aim of the proposed study.

THE NEED FOR APPROPRIATE INFORMATION SYSTEMS

The sheer volume of data which needs to be organised to provide useful environmental information has prompted many organisations to look to computer-based information systems for help. The growing environmental information systems market has been quick to highlight the benefits offered by an information technology platform which supports features such as remote monitoring, scenario modelling and data visualisation. However, as commercial conferences begin to explore the strategic issues and share practical experiences surrounding the emerging use of IT in environmental management, it becomes increasingly clear that technology does not offer a panacea for resolving the complex issues involved in providing environmental information. Recent academic literature suggests that theories which purport to facilitate the choice of information technologies are overly prescriptive and often do not recognise the complex nature of the organisational climate in which the information and technologies will be used. This study seeks to identify those aspects of organisational context which shape efforts to provide environmental information as a necessary precusor to exploring the appropriateness or otherwise of particular information technology solutions.

So far this paper has alluded to current efforts to provide environmental information within an organisational climate of limited resources and incomplete understanding of the complex nature of interactions between business and the socio-ecological environment. It has highlighted problems involved in assimilating imperfect and disparate data to provide concerned individuals and stakeholder groups with pertinent information, and has argued the importance of locating these issues in an organisational context if insights which facilitate desirable and feasible interventions are to be gained. The paper will now explain why a research study based in the UK waste management industry would be particularly valuable.

IMPLICATIONS FOR THE WASTE INDUSTRY

Activities associated with the management and disposal of waste have the potential to impact upon all environmental transmission media: air, ground and water; and those in the business of waste management are charged with providing a service to society at large whilst remaining sensitive to local community concerns. In the continual search for industry-leading performance

in waste management an ability to manage information effectively is increasingly regarded as critical. Efficient and responsible practice necessitates continual assimilation of data from all levels of operations and the need to manage relationships with many different stakeholders makes satisfying demands for environmental information a vital but difficult task. In the UK, legislation plays a forceful role in shaping the responsibilities assumed by operators for collecting and communicating a diverse range of environmental data and it is becoming increasingly obvious that procedures and systems put in place now must be capable of managing environmental information for many years to come. A capability to provide decision-relevant information when and where it is needed is regarded by many in the waste industry as essential and urgently needed.

However, this paper has put forward the argument that organisations are unlikely to be effective when developing this kind of capability unless they can recognise and manage for :

- aspects of organisational context which shape attempts to provide information,
- the variety in demands for environmental information which need to be supported.

The final section of the paper introduces a framework for a study which would enable a single researcher to work with a specific waste management organisation to develop a sensitivity to ways in which disparate and diverse data can be translated into useful environmental information. The organisation chosen for the study is WasteCo.

DISCOVERING WHERE DATA CAN BE TRANSLATED INTO USEFUL INFORMATION

A central challenge for any study of organised attempts to provide information is how to recognise the variety inherent in individual interpretations of data and events in order to ensure that only relevant information is presented to decision makers. This study proposes to use the notion of stakeholder agendas to frame shared concerns so as to encourage reflection on the appropriateness - both in terms of choice and format - of environmental data presented to internal and external audiences. As the study aims to identify attributes of a pathway to improved information provision which is not only desirable but also feasible, it will also look at those aspects of organisational setting which influence attempts to provide environmental information, ie. the important logistical, financial, legislative and cultural considerations.

In a period to be agreed with the host organisation between 1 August 1995 and 9 September 1995, a single researcher will undertake an analysis of formal documentation, company policy and procedures pertaining to the provision of environmental information at varying levels with the organisation. In addition to research within the host organisation, the study will also look at demands for environmental information generated by external individuals and organisations, ie. regulatory bodies and local residents. Findings from the study will be documented and made available to the host organisation and will eventually contribute to the researcher's Doctorate thesis. It is envisaged that the host organisation will not only benefit from the product of this study but also from the process of research involved and it is hoped that this investigatory period will facilitate the formation of a mutually-beneficial working relationship so that on-going insights may be sought after the initial period outlined.

THE RESEARCHER

The researcher, Mark Stubbs, is a senior lecturer specialising in distributed Information Systems in the Department of Business Information Technology at the Manchester Metropolitan University, and is currently studying for a PhD with the International Ecotechnology Research Centre at Cranfield University on a part-time basis. He has a first degree in Information Systems Engineering from Durham University and prior to becoming a lecturer in 1992, he worked on large-scale client-server computing projects for both public and private sector clients as a consultant with Andersen Consulting. He has published and edited articles in the area of information technology and environmental management and has been invited to speak at several recent conferences in the area.

13.2 FLIPCHARTS FROM DATA INTEGRATION BRAINSTORMING

warm up session: uses of an onion

decoration
eating
storage system
disguise
balance for bicycles
insect repellant
self defence
dye making
acting
counting
crying

warm up session: more uses of an onion

head of a puppet
dog food
balls
printing
chopping
banana skin-like device
teaching aid

aspects of the environmental information problem

identify linkages
identify gaps
understand Beds. system
define 'environmental'
social ?
sustainable development
scope ?
breakdown barriers
looking in a wider way
possible ?

more aspects of the environmental information problem

aid to policy/decision-making
& resource allocation
& for purchasing plans
education - formal & community awareness
unleashing synergy
cooperation
forewarning
common agreement on a common agenda
consensus on 'facts'/action

ways to restate the problem

How to understand forces shaping Beds environment ?
H2 understand key features of sustainable development/ sustainability in Beds ?
H2 develop a means of cooperation for data integration?
H2 translate cooperation into an agreed way forward ?
H2 decide how to make environmental information available ?

more ways to restate the problem

H2 decide who's involved ?
H2 decide what data is needed ?
☆ H2 define project scope ?
H2 define gaps in information/ cooperation & find ways to fill 'em ?
H2 tackle technical/financial aspects of information sharing ?
H2 cooperate ?

ideas on how to define project scope

look at similar projects
see what's relevant/possible
look at available manpower/ resources
look at timescales
visualise the end state
know where you are now
spot obvious problems
'how can I go forward when I don't know which way I'm facing' - John Lennon

metaphors for scoping this project

making a bubble
chasing a dream
☆ making a model kit / jigsaw
creating a work of art

ideas on how to make a model kit/jigsaw

find the edge-pieces / corners
read any instructions
look at finished article
play around with the pieces
look for any obvious logical connections
look for potential fits
seek help
divide and conquer - deal with parts
follow patterns
count pieces before starting
get a big enough board
make sure you haven't got better things to do

more ideas on how to make a model kit / jigsaw

don't let other people mess with the pieces or the picture
try not to get distracted - stick to one jigsaw at a time
choose a simple one
make sure you've got enough time
get started - go for it / 'just do it !'
you've got to want to do it
find somewhere safe to leave it when you're not working on it
think how it will be displayed when its finished
think about what's next - plan to continue

bringing the ideas back to the env. info. problem

look at other peoples stuff
- review best practice

define 'picture
- and see what we can use

adapt current best practice to our needs
define instructions
identify 'pieces' and where they are (scattered around)
find which pieces make up our 'jigsaw'
categorise potential 'pieces'
see how main pieces might fit
- big ones first

more ideas

pieces picture
data sets
players
- 'own them'
- commitment to sharing ?

caution - this is a family jigsaw - people may hide pieces !
persuade players by explaining value of their contribution and highlighting whats in it for them

'players'

Planning dept
Social services & client groups
Beds. health
Education
Housing
Env. health
Engineers
Libraries
Wildlife Trust
English Nature
General Public
English Heritage
Env. Agency
Beds. Police
Security Services
DVLC
Probation services
Institute of Terresterial Ecology
Cranfield, DMU+Luton
Museums
Comparison with Herts
Govnt. Office Eastern Region
Industry
TEC
Eastern Elec
British Gas
Anglian & Thames Water
Tesco & Sainsbury

more 'players'

GPs
Family Health Practitioner Committee
Big employers
Green Business Network
Eastern Council for Sport & Recreation
Schools
Forrestry
Beds rural communities group
Beds community volunteer services (urban)
Farmers - NFU ?
M.A.F.F.
'Canary' groups - eg asthmatics
Office population census
Central Stats. Office

some rules

do/don't tread on anyone's toes !
'just the facts ma'am' ?
access - entrance fee ?
think audience
try not to 'harm'/distort the picture
watch out for the political power of information

dealing with a dynamic picture
'photo of a football match would present a strange view'
how to define a projector to produce a moving picture ?

bringing back ideas about projectors ...

importance of audience
- professional or non-expert players or
- general public
- simple ? focussed ?
- H2 present ? visual / graphic

specific thematic / interest areas
showing linkages
- allowed ?
- feasible ?
- H2 learn to spot clusters of insights that can be usefully linked ?

ideas on relevant root definitions

A system
to improve decisions affecting the quality of life and the environment of Bedfordshire
by means of bringing together people and data ... & developing links ...
(clusters / learning / relationships)
in order to improve the quality of life and the environment of Bedfordshire

more ideas on relevant root definitions

A system
to inform decision making in Bedfordshire
by identifying and developing links between organisations and the data they hold
- brokering deals

and by developing a means of analysing and communicating the shared / linked information
in order to ... LA21 ...

13.3 FLIPCHARTS FROM NAQS WORKSHOP 1

Problems with managing AQ in Beds ...

- H2 quantify population exposure ?
- H2 restrict cars going into town centres ?
- H2 prioritise pollutants ?
- H2 change people's behaviour ?
- H2 publish monitoring data regularly ?
- H2 finance initiatives ?
- H2 reconcile opposing Govt priorities ?
- H2 encourage participation ?
- H2 find if AQ is a problem ?
- H2 get from A to B without a car (quickly) ?
- H2 get people to question habits ?
- H2 apply life cycle costing honestly ?

Problems with managing AQ in Beds ...

- H2 improve access to town centres ?
- H2 quantify disbenefits ?
- H2 provide AQ S.W.O.T. analysis ?
- H2 get beyond £ quantification ?
- H2 communicate AQ issues > public ?
- H2 find if public really care ?
- H2 prioritise AQ ?
- H2 get data to substantiate concerns ?
- H2 deal with vested interests ?
- H2 discover toxin levels ?
- H2 take message to industry ?
- H2 interpret data collected ?
- H2 identify causes of problems ?
- H2 answer question 'so what ?'
- H2 predict the future ?

Problems with managing AQ in Beds ...

- H2 interpret intellectual documents ?
- H2 link up with other authorities ?
- H2 get political acceptance for changing the status quo ?
- H2 deal with international issues ?
- H2 change economic infrastructures (in a competitive world) ?
- H2 educate public effectively ?
- H2 quantify effect on sensitive groups ?
- H2 link AQ with 'Quality of Life' ?
- H2 define & audit clean technology ?
- H2 get alternative fuels ?
- H2 cut down demand for energy ?
- H2 achieve/define sustainable development?
- H2 use more renewable energy ?
- H2 use less non-renewable energy ?
- H2 change perceptions of the car ?
- H2 change education practices ?

Problems with managing AQ in Beds ...

- H2 use regulation ?
- H2 use economic instruments ?
- H2 use planning process ?
- H2 encourage stick & carrot ?
- H2 benefit from changing working practices ?
- H2 agree on H2 act ?
- H2 put it into practice ?
- H2 get other countries to act & help them ?
- H2 keep car & be healthy ?
- H2 promote non-polluting (electric) cars ?
- H2 prioritise action in mixed urban / rural ? environment ?
- H2 engender climate of personal responsibility for the wider good ?
- H2 decide if standards are correct ?
- H2 regenerate town centres ?
- H2 stop pollution increasing after 2005 ?
- H2 promote alternative modes of transport ?
- H2 balance employment & housing to reduce commuting ?

Problems with managing AQ in Beds ...

- H2 meet increased demands for access ?
- H2 locate schools nearer to client groups ?
- H2 cultivate more rational behaviour ?
- H2 solve population problem ?
- H2 best use new technology to help us ?
- H2 encourage working from home ?
- H2 react to scare stories about health effects ?
- H2 link AQ Strategy with others ?
- H2 encourage community heating schemes ?
- H2 get organisations to work together ?
- H2 assess energy efficiency - industrial & domestic ?
- H2 sustain comfort standards ?
- H2 persuade people to accept lower
- H2 bring down cost of public transport ?
- H2 encourage park & ride ?
- H2 shift tax from ownership to vehicle use ?
- H2 get central Govt to implement national transport policy ?
- H2 get car industry to reduce production ?
- H2 not discriminate against elderly villagers ?

Problems with managing AQ in Beds ...

- H2 not restrict development that pollutes ?
- H2 keep sight of sensitive AQ groups ?
- H2 make children aware of the problem & their role ?
- H2 get vehicle manufacturers to improve efficiency ?
- H2 quantify personal exposure ?
- H2 get at relationship between outside/inside AQ?
- H2 publish meaningful AQ data ?
- H2 produce safe env. for walking & cycling ?
- H2 pay for all this ?
- H2 get buck stops here message across ?
- H2 produce realistic public transport infrastructure ?
- H2 encourage use of
- H2 address transportation of goods ?
- H2 achieve more honest marketing ?
- H2 know if we're measuring right pollutants ?
- H2 encourage delivery of goods not collection ?
- H2 distinguish between wants & needs ?
- H2 best involve health practitioners ?

Problems with managing AQ in Beds ...

- H2 shorten time scales ?
- H2 reduce complex issues to simple actions?
- H2 get political support for long term objectives ?
- H2 encourage a democracy that consults (other than at election times) ?
- H2 ensure communication with 100% of population ?
- H2 encourage long term thinking ?
- H2 incorporate reviews of objectives ?
- H2 remedy apathy ?
- H2 translate overall benefits into individual benefits ?
- H2 get people interested ?
- H2 keep interest pot boiling ?
- H2 encourage involvement of people with all hats on, eg as consumers & shareholders?
- H2 stop car = status symbol ?
- H2 encourage active networking ?
- H2 reduce over packaging ?
- H2 stop taking waste from London ?
- H2 overcome org./bureaucratic obstacles/inertia ?
- H2 stop local hands being tied by Central Govt ?
- H2 overcome NIMBYism ?

Problems with managing AQ in Beds ...

- H2 get Central Govt to take risks ?
- H2 work together with other areas ?
- H2 tackle worst polluters ?

Problem Clusters

- Political
- Transport
- Communication
- Economic
- Organisational
- Social
- Personal
- Technical
- Legal
- Education
- Responsibility
- Lifestyle (human nature, greed, power)
- Public participation
- Local
- Global
- Measuring
- Implementation & enforcement
- Changing attitudes
- Defining problem
- Land use planning
- Cost
- Risk
- Health
- Energy conservation

Some key areas & some critical questions

- Dialogue & education
- Defining & monitoring risk
- Transport / technology

- H2 empower public ?
- H2 establish risk & know what to do about it?
- H2 target our efforts for Air Quality ?
- H2 manage when you're being pulled in different directions ?

H2 target effectively ?

- Need to know what to aim at
- Need appropriate missile
- Need appropriate launcher
- Need someone to fire it
- Need someone who's prepared to fire it
- Need to be sure people won't mind fall out
- Need to know where target might be
- Need to know how big missile needs to be
- Use a missile that locks on
- Does target want to be hit ?
- Bows & arrows vs semtex
- Can we afford the missile ?
- We need feedback to see if it has hit
- Big bang or lots of little ones ?
- Experiment
- Everyone is pointing at everyone else
- Need a method of sighting
- Need to allow for distractions, deflections
- What if we hit ?
- What if we miss ?
- Will it fire back ?

H2 target effectively ? (continued ...)

- When to fire ?
- Is it in target's interest to be hit ?
- Bang and/or bar of gold ?
- Pleasure / pain principle
- Biggest effect ?
- Use a biological weapon - infection spread
- Use shrapnel
- Constructive not destructive
- Keep firing - one shot or a machine gun ?
- Soften 'em up first
- Propaganda

H2 ensure we don't hit the target?

- Measure effects
- Choose a non-receptive target
- Aim somewhere else
- Do nothing
- Provide bread & circus free
- Use Quality systems - 'wrong first time ...'
- Fire a rocket that doesn't work
- Seek sponsorship
- Keep talking about it
- Wait for someone else to fire first
- Wait for target to die of other causes or go away
- Make ploughshares not rockets
- Get Central Govt to do it
- Attend spatula seminars
- Be politically sensitive
- Try to please everyone
- Allocate blame

Ideas on targeting effort for AQ

- Hit receptive minds
- Realise not all minds are receptive
- Encourage action
- Reward change
- Be persistent
- Be consistent
- Be clear of what we're aiming & at who
- Need simple, receivable message
- Encourage consensus
- Change our language
- Spell out 'What's In it For Me'
- Be aware of hierarchy of needs
- Be realistic
- Realise it may only be a stage
- We need to measure our success
- Look for examples of working systems
- Ensure communication infrastructure is there
- Take it to the children
- Flexibility - allow for resistance building up

Ideas on targeting effort for AQ (cont ...)

- Mandate change
- Use sticks & carrots
- Translate overall benefits into individual benefits
- Do not just tell
- Don't be arrogant - be humble
- Be sensitive
- Empathise
- Avoid mixed messages

Ideas sparked by weapon metaphor over lunch ..

- Weapons development fastest in war time
- We need a crisis
- A crisis focuses the mind
- Necessity is the mother of invention
- Intense pressure & urgency perceived by all
- In a crisis normal barriers are removed
- In a crisis rapid prioritisation occurs
- Greater risk taking is possible
- Money becomes less of an issue
- Shared fear - everyone knows someone directly affected by the crisis
- A fighting spirit can emerge
- An identifiable common enemy brings people together as "we"
- Remember that society is becoming immune to scare stories - danger of crying wolf
- Possible that small changes could send us into environmental crisis - how can we be ready ?

H2 manage when pulled in different directions

- Get some guidelines / rules
- Prioritise
- Decide which is important
- Switch off
- Be aware that new technologies may change rules
- Review priorities explicitly
- Focus beyond the problem
- Look for win-win solutions
- Dis-solve the problem
- Change demands
- Make your pullers re-define what they want
- Decide to go for one
- Review your resources
- Toss a coin

H2 manage when pulled in different directions

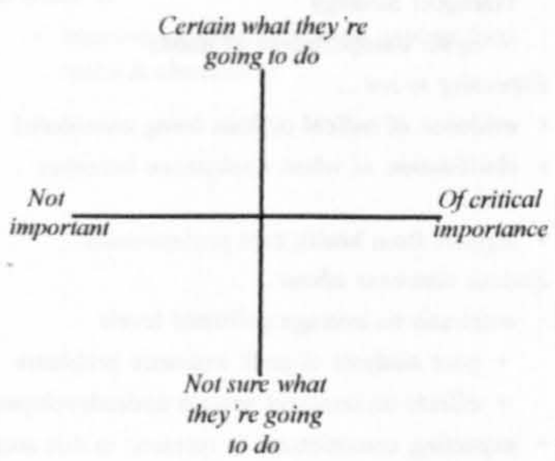
- Move in a 3rd direction to unite other 2
- Seek reconciliation between the 2
- Put it off - do nothing
- Delegate
- Look for consensus
- Work on a sharable vision of a better future
- Assess costs/benefits of options
- Seek advice on what's best & who to disappoint
- Think beyond the immediate
- Get lots of people on your side
- Arbitration
- Sit down & explore conflicting demands
- Be honest
- Coalescence
- Employ a management consultant
- Go for the easiest option
- Shout help !
- Use the 80/20 rule

Emerging ideas from first workshop

- Need to work together
- Need to look for common ground
- Need to define who needs to work together

Activity

- **Try to map the key stakeholders who need to work together for Air Quality in Beds**



13.4 FLIPCHARTS FROM NAQS WORKSHOP 2

Agenda for 24/10/96

- N.A.Q.S. improvements
- Leverage - small, local action => big effect
- Resources
- Next steps
- 2005

Improvements to N.A.Q.S. ....

Include statements on ...

- increasing targeted education
  - eg. making air quality awareness part of driver training
- shifting tax burden onto vehicle usage

General concerns about ...

- document's intended audience
- fudging issues - eg sustainable development
- document not seen to be encouraging public transport strongly
- document aim not being clear
  - worries that it was just for show !

Looking to see ...

- other AQ information to be pulled together - eg radiological board
- clarification about natural & man-made hazards
- justification for choice of prescribed pollutants
- NAQS to include indoor as well as outdoor measurement
- commitment to appropriate research

Improving N.A.Q.S. ...

- shouldn't wait for EC to monitor V.O.C.s
  - eg photo-chemical smog effects
- looking for clear integration with National Transport Strategy
  - eg re: transportation of goods

Expecting to see ...

- evidence of radical options being considered
- clarification of when a substance becomes toxic
- support from health care professionals

Serious concerns about ...

- emphasis on average pollutant levels
  - poor analysis of peak exposure problems
  - effects on sensitive groups underdeveloped
- expecting commitment to research in this area
- Welcome precautionary principle being recognised but would like document to go further

Improving N.A.Q.S. ...

- reword text on importance of peaks
- emphasis on secondary data raised concerns about getting hold of data & confidence in its accuracy & appropriateness

Would welcome ...

- guidance on where & how to monitor
- stronger emphasis on alternative fuels
- more research on personal exposure
- comments on existing & new vehicle fleets
- clear statement about importance of regularly collecting local AQ data
- clear statement about whether £ is available if criteria aren't exceeded, eg for monitoring
- greater emphasis on role of primary data

Suggest ...

- Tax options (eg on fuel) should be explored to fund L.A. AQ efforts

Improving N.A.Q.S. ...

Welcome guidance on ...

- AQ modelling tools
- links between AQ and land-use planning
- how NAQS aligns with LA21

General comments ...

- expecting a clear framework
- document is really very vague
- expecting more guidance on health effects
- would welcome research on effectiveness of various AQ improvement measures. eg :
  - tackling pollution at source
  - traffic management, ie speed limits
- real danger of so-called 'enabling legislation' resulting in responsibility being delegated without resources
  - merely moving the problem

Looking for points of leverage ...

- Legislation can be an important lever but areas where it couldn't be applied indicate opportunities to alter it
- Education is also an important lever
- Review of H2 problems indicated an encouraging number of areas where local actions could be beneficial
- Important distinction between ease of using lever & its effectiveness, eg:
  - easy to encourage people, easy to supply information but will it change behaviour?

Looking for points of leverage ...

Education/community

- cohesive managing group - involving all parties
- good, non-arrogant publicity
- appropriate education - schools & elsewhere
- provide facilities which make information more available & change working practices
- develop green award schemes

Pollutants

- make data available in understandable form
- ensure national coordination/networks

Planning

- structure plans need to realistically reflect AQ needs
- make AQ justification an explicit planning requirement

Looking for points of leverage ...

Transport

- more rigorous enforcement of emissions
- traffic management to consider AQ issues
- messages to business :
  - eg backloading & transport audits

Government National & Local

- Council policy to consider health/ environment implications in every committee report
- shift tax emphasis to use of vehicles
- define requirements & finance from Government - 'Here's the dosh'
- lobbying & education of national & local representatives

Resources we can tap into ...

- Schools / educational establishments
- Government Information Office
- LAs - worries about no capacity ? authority?
  - Environment Depts
  - Planning
  - Transportation
  - LA21
  - be aware of statutory responsibilities
- EU funding - for research with local benefits
- voluntary groups
- bus companies
- libraries
- internet
- Beds & Herts (BAHAMaS)
- regional groups
- National Society for Clean Air
- DoE
- health authority
- GPs
- business / employers
- emergency services

Some desirable & feasible action ...

A project coordinated by

- the licensing section of the LA

to achieve

- an increased frequency of emissions testing for taxis & private hire vehicles

by means of

- imposing licence conditions

in order to

- improve air quality in town centres (taxi ranks & elsewhere)

Some desirable & feasible action ...

A project coordinated by

- the green business network

to achieve

- a reduction in fuel use

by means of

- encouraging businesses to consider flexible working arrangements

in order to

- reduce the need to travel

Some desirable & feasible action ...

A project to

- launch community transport scheme which may be model for others (BPE&SOs)

by means of

- community participation & design, monitoring & review/providing info. eg:
  - schools initiatives
  - cycle schemes
  - bus company cooperation
  - voluntary speed limit

in order to

- improve local air quality, quality of life, address resource consumption (=SD!)
- promote local ownership of actions

coordinated by

- LA21 in Goldington

involving

- LA, community, voluntary groups, police, businesses, bus companies, schools, LA21, universities, press

timescale

- up & running in 12 months with regular reviews & further targets to be set